IBM System x3500 M4

IBM Redbooks Product Guide

The IBM® System x3500 M4 server provides outstanding performance for your business-critical applications. Its energy-efficient design supports more cores, memory, and data capacity in a scalable Tower or 5U Rack package that is easy to service and manage. With more computing power per watt and the latest Intel Xeon processors, you can reduce costs while maintaining speed and availability.

Suggested use: infrastructure applications, collaboration/email, web, and virtualized desktops in a workgroup or distributed environments.

Figure 1. The IBM System x3500 M4

Did you know?

The x3500 M4 offers a flexible, scalable design and simple upgrade path to 32 HDDs, with up to eight PCIe 3.0 slots and up to 768 GB of memory. The Onboard Ethernet solution provides four standard integrated Gigabit Ethernet ports without occupying PCIe slots. Comprehensive systems management tools with the next-generation Integrated Management Module II (IMM2) make it easy to deploy, integrate, service, and manage.

Key features

A high-performance dual-socket tower server, the IBM System x3500 M4, can deliver the scalability, reliable performance, and optimized efficiency for your business-critical applications. Start with the basics and upgrade as your business changes without jeopardizing existing investments. Virtualizing the PC infrastructure into one server can provide access to a powerful server with abundant storage space, while significantly reducing IT costs.

Scalability and performance

The x3500 M4 offers numerous features to boost performance, improve scalability, and reduce costs:

- Intel Xeon processor E5-2600 v2 product family
  - Improves productivity by offering superior system performance with 4-core and 6-core processors (up to 3.5 GHz core speeds), 8-core processors (up to 3.3 GHz core speeds), 10-core processors (up to 3.0 GHz), and 12-core processors (up to 2.7 GHz core speeds), up to 30 MB of L3 cache, and up to two 8 GT/s QPI interconnect links.
  - Supports up to two processors, 24 cores, and 48 threads maximize the concurrent execution of multi-threaded applications.
  - Supports up to 1866 MHz memory speeds.
  - Will support up to 768 GB memory with 32 GB LRDIMMs when and if they become available.
- Intel Xeon processor E5-2600 product family
  - Improves productivity by offering superior system performance with 8-core processors and up to 2.9 GHz core speeds, up to 20 MB of L3 cache, and up to two 8 GT/s QPI interconnect links.
  - Supports up to two processors, 16 cores, and 32 threads maximize the concurrent execution of multi-threaded applications.
  - Supports up to 1600 MHz memory speeds.
  - Supports up to 768 GB memory with 32 GB LRDIMMs.
- Intelligent and adaptive system performance with Intel Turbo Boost Technology 2.0 allows CPU cores to run at maximum speeds during peak workloads by temporary going beyond processor TDP.
- Intel Hyper-Threading Technology boosts performance for multi-threaded applications by enabling simultaneous multi-threading within each processor core, up to two threads per core.
- Intel Virtualization Technology integrates hardware-level virtualization hooks that allow operating system vendors to better utilize the hardware for virtualization workloads.
- Intel Advanced Vector Extensions (AVT) can significantly improve floating point performance for compute-intensive technical and scientific applications.
- Up to 32 drive bays together with internal backup and optical drive at the same time provide a flexible and scalable all-in-one platform to meet increasing demands.
- Will support 12 Gbps SAS RAID portfolio when and if it becomes available.
- The use of solid-state drives (SSDs) instead of or along with traditional spinning drives (HDDs) can significantly improve I/O performance. An SSD can support up to 100 times more I/O operations per second (IOPS) than a typical HDD.
- The server has four integrated Gigabit Ethernet ports that double the network throughput compared with the previous generation of IBM System x® servers.
- The server offers PCI Express 3.0 I/O expansion capabilities that improve the theoretical maximum bandwidth by almost 100% (8 GT/s per link using 128b/130b encoding) compared to the previous generation of PCI Express 2.0 (5 GTps per link using 8b/10b encoding).

- With Intel Integrated I/O Technology, the PCI Express 3.0 controller is integrated into the Intel Xeon processor E5 family. This helps to dramatically reduce I/O latency and increase overall system performance.
- Support for NVIDIA Quadro graphics processing units (GPUs) to maximize computing power.

Availability and serviceability

The x3500 M4 provides many features to simplify serviceability and increase system uptime:

- The server offers Chipkill, memory mirroring and memory rank sparing for redundancy in the event of a non-correctable memory failure.
- Tool-less cover removal provides easy access to upgrades and serviceable parts, such as CPU, memory, and adapter cards.
- The server offers hot-swap drives supporting RAID redundancy for data protection and greater system uptime.
- The server has up to two redundant hot-swap power supplies and up to six simple swap N+N redundant fans to provide availability for business-critical applications.
- The power source independent light path diagnostics panel and individual light path LEDs quickly lead the technician to failed (or failing) components. This simplifies servicing, speeds up problem resolution and helps improve system availability.
- The Predictive Failure Analysis (PFA) detects when system components (for example, processors, memory, hard disk drives) operate outside of standard thresholds and generates pro-active alerts in advance of possible failure, therefore increasing uptime.
- Solid-state drives (SSDs) offer significantly better reliability than traditional mechanical HDDs for greater uptime.
- Built-in Integrated Management Module Version II (IMM2) continuously monitors system parameters, triggers alerts, and performs recovering actions in case of failures to minimize downtime.
- Built-in diagnostics using Dynamic Systems Analysis (DSA) Preboot speeds up troubleshooting tasks to reduce service time.
- Three-year customer replaceable unit and onsite limited warranty, next business day 9x5. Optional service upgrades available.

Manageability and security

Powerful systems management features simplify local and remote management of the x3500 M4:

- The server includes an Integrated Management Module II (IMM2) to monitor server availability and perform remote management.
- Integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.
- Integrated Trusted Platform Module (TPM) 1.2 support enables advanced cryptographic functionality, such as digital signatures and remote attestation.
- Industry-standard AES NI support for faster, stronger encryption.
- IBM Systems Director is included for proactive systems management. It offers comprehensive systems management tools that help to increase up-time, reduce costs, and improve productivity through advanced server management capabilities.
- Intel Execute Disable Bit functionality can help prevent certain classes of malicious buffer overflow attacks when combined with a supporting operating system.
- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance

to malicious software attacks, allowing an application to run in its own isolated space protected from all other software running on a system.

Energy efficiency

The x3500 M4 offers the following energy-efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to the green environment:

- Energy-efficient planar components help lower operational costs.
- The x3500 M4 is Energy Star 2.0 compliant. Energy Star is the trusted, US government-backed symbol for energy efficiency, with the goal of helping customers save money and protect the environment through energy efficient products and practices. For the Power and Performance Data Sheet, see http://ibm.com/systems/x/hardware/energy-star
- High-efficient 550 W, 750 W and 900 W power supplies with 80 PLUS Platinum certification.
- The Intel Xeon processor E5-2600 and E5-2600 v2 product families offer significantly better performance over the previous generation while fitting into the same thermal design power (TDP) limits.
- Intel Intelligent Power Capability powers individual processor elements on and off as needed, to reduce power draw.
- Low-voltage Intel Xeon processors draw less energy to satisfy demands of power and thermally constrained data centers and telecommunication environments.
- Low-voltage 1.35 V DDR3 memory RDIMMs consume 15% less energy than 1.5 V DDR3 RDIMMs.
- Solid state drives (SSDs) consume as much as 80% less power than traditional spinning 2.5-inch HDDs.
- The server uses hexagonal ventilation holes, a part of IBM Calibrated Vectored Cooling™ technology. Hexagonal holes can be grouped more densely than round holes, providing more efficient airflow through the system.
- IBM Systems Director Active Energy Manager™ provides advanced data center power notification and management to help achieve lower heat output and reduced cooling needs.

Locations of key components and connectors

Figure 2 shows the front of the server.

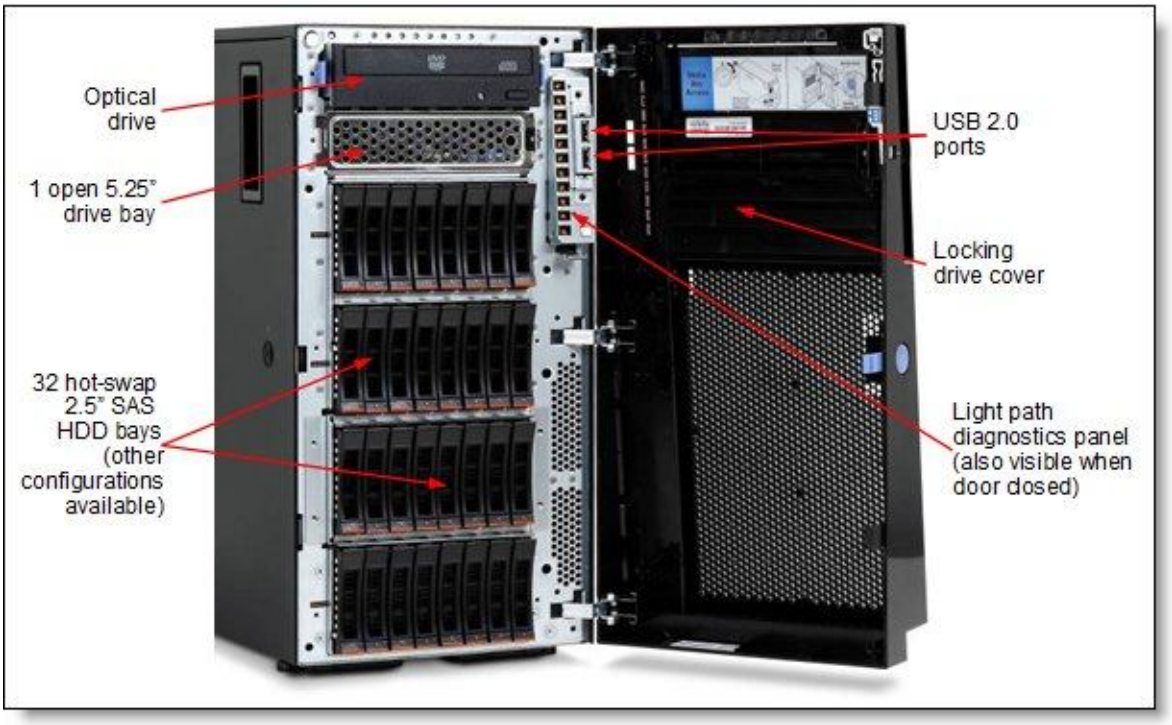

Figure 2. Front view of the IBM System x3500 M4

Figure 3 shows the rear of the server.

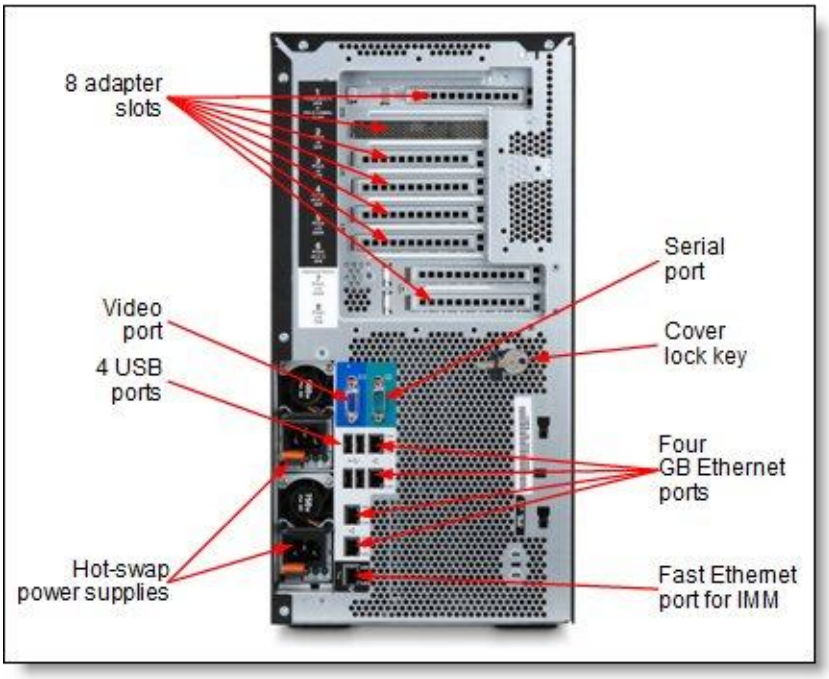

Figure 3. Rear view of the IBM System x3500 M4

Figure 4 shows the locations of key components inside the server.

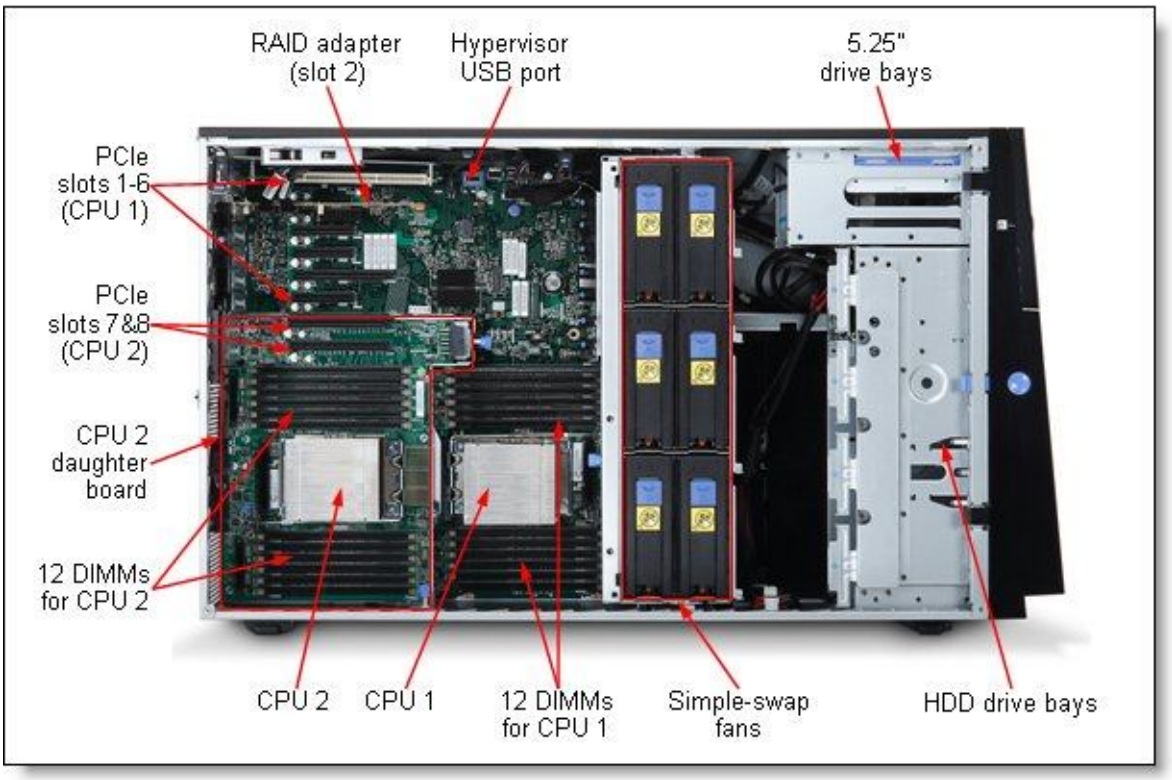

Figure 4. Inside view of the IBM System x3500 M4

Standard specifications

The following table lists the standard specifications.

Table 1. Standard specifications (part 1)

Components	Specification
Form factor	Tower or 5U Rack.
Processor	E5-2600 v2: Up to two Intel Xeon processor E5-2600 v2 product family CPUs with 12 cores (up to 2.7 GHz) or ten cores (up to 3.0 GHz) or eight cores (up to 3.3 GHz) or six cores (up to 3.5 GHz) or four cores (up to 3.5 GHz). Two QPI links up to 8.0 GT/s each. Up to 1866 MHz memory speed. Up to 30 MB L3 cache. E5-2600: Up to two Intel Xeon processor E5-2600 product family CPUs with eight cores (up to 2.9 GHz) or six cores (up to 2.9 GHz) or quad-cores (up to 3.3 GHz). Two QPI links up to 8.0 GT/s each. Up to 1600 MHz memory speed. Up to 20 MB L3 cache.
Chipset	Intel C602J.
Memory	Up to 24 DDR3 DIMM sockets (12 DIMMs per processor). E5-2600 v2: RDIMMs and UDIMMs are supported. Support for LRDIMMs (Load Reduced DIMMs) is planned for earlier in 2014. Memory types cannot be intermixed. Memory speed up to 1866 MHz. E5-2600: RDIMMs, UDIMMs, and LRDIMMs are supported, but memory types cannot be intermixed.
Memory maximums	E5-2600 v2: ● With UDIMMs: Up to 128 GB with 16x 8 GB UDIMMs and two processors. ● With RDIMMs: Up to 384 GB with 24x 16 GB RDIMMs and two processors ● With LRDIMMs (support is planned for earlier in 2014): Up to 768 GB with 24x 32 GB LRDIMMs and two processors E5-2600: ● With LRDIMMs: Up to 768 GB with 24x 32 GB LRDIMMs and two processors. ● With RDIMMs: Up to 384 GB with 24x 16 GB RDIMMs and two processors. ● With UDIMMs: Up to 64 GB with 16x 4 GB UDIMMs and two processors.
Memory protection	ECC, Chipkill (for x4-based memory DIMMs), memory mirroring, and memory rank sparing.
Disk drive bays	Up to 32 2.5" hot-swap SAS/SATA HDDs, or up to eight 3.5" hot-swap SAS/SATA HDDs, or up to eight 3.5" Simple Swap SATA HDDs.
Maximum internal storage	38.4 TB with 1.2 GB 2.5" SAS HDDs, or 32 TB with 1 TB 2.5" SATA HDDs, or 32 TB with 4 TB 3.5" SATA HDDs, or 51.2 TB with 1.6 TB 2.5" SAS SSDs. Intermix of SAS/SATA is supported.
RAID support	6 Gb SAS/SATA: RAID 0, 1, 10 with M1115 or M5110. Optional upgrade to RAID 5, 50 available for M1115. Optional upgrades to RAID 5, 50 are available for M5110 (zero-cache; 512 MB battery-backed cache; 512 MB or 1 GB flash-backed cache). Optional upgrade to RAID 6, 60 available for M5110 with 512 MB or 1 GB cache upgrades. 12 Gb SAS/SATA support planned for 1Q/2014: RAID 0, 1, 10 with optional M5210. Optional upgrades to RAID 5, 50 are available for M5210 (zero-cache; 1 GB non-backed cache; 1 GB or 2 GB flash-backed cache). Optional upgrade to RAID 6, 60 for M5210 with 1 GB or 2 GB cache upgrades.
Optical drive bays	Two half-height 5.25" bays for optical or tape drives. Supports DVD-ROM or Multiburner.
Tape drive bays	Two half-height 5.25" bays for optical or tape drives. Support for one RDX or DDS internal USB tape drive. Supports up to two LTO internal SAS tape drives.
Network interfaces	Four integrated Gigabit Ethernet 1000BASE-T ports (RJ-45) based on Intel I350AM4 Quad Port GbE LAN Controller chip.

Table 1. Standard specifications (part 2)

Components	Specification
PCI Expansion slots	Up to eight slots with two processors and six slots when one CPU is installed. All slots are PCIe 3.0 slots except Slot 1, which is a Gen 2 slot: ● Slot 1: PCIe x8 (x4 wired); full-height, half-length (supports optional PCI-X 64 bit/133 MHz interposer card) ● Slot 2: PCIe x8; full-height, half-length ● Slot 3: PCIe x8; full-height, full-length ● Slot 4: PCIe x8 (x4 wired); full-height, full-length ● Slot 5: PCIe x16; full-height, full-length ● Slot 6: PCIe x8 (x4 wired); full-height, full-length ● Slot 7: PCIe x16; full-height, full-length (requires second processor) ● Slot 8: PCIe x16; full-height, full-length (requires second processor)
Ports	Two USB 2.0 ports on front. Four USB 2.0, one DB-15 video, one DB-9 serial, one RJ-45 systems management, four RJ-45 GbE network ports on rear. Two internal USB ports (for embedded hypervisor and internal tape drive).
Cooling	IBM Calibrated Vectored Cooling with up to six simple swap fans (two fans shipped standard on single processor models and three fans shipped on dual processor models) with optional N+N redundancy available .
Power supply	Up to two redundant hot-swap 550 W ac, 750 W ac or 900 W ac power supplies (80 PLUS Platinum certification).
Hot-swap parts	Hard drives, power supplies.
Systems management	UEFI, IBM Integrated Management Module II (IMM2), Predictive Failure Analysis, Light Path Diagnostics, Automatic Server Restart, IBM Systems Director and IBM Systems Director Active Energy Manager, IBM ServerGuide. Optional IBM Integrated Management Module Advanced Upgrade via Feature on Demand (FoD) for remote presence (graphics, keyboard and mouse, virtual media).
Security features	Power-on password, administrator's password, Trusted Platform Module (TPM).
Video	Matrox G200eR2 with 16 MB memory integrated into the IMM2. Maximum resolution is 1600x1200 at 75 Hz with 16 M colors.
Operating systems supported	Microsoft Windows Server 2008 R2, 2008 and 2012 (support for 2012 R2 is planned for earlier in 2014), Red Hat Enterprise Linux 5 and 6, SUSE Linux Enterprise Server 10 and 11, VMware ESX 4.1 and ESXi 4.1 (E5-2600 only), and VMware vSphere 5.0 and 5.1.
Limited warranty	3-year customer-replaceable unit and onsite limited warranty with 9x5/NBD.
Service and support	Optional service upgrades are available through IBM ServicePacs®: 4-hour or 2-hour response time, 8-hour fix time, 1-year or 2-year warranty extension, remote technical support for IBM hardware and selected IBM and third-party (Microsoft, Linux, VMware) software.
Dimensions	Width: 218 mm (8.6 in), depth: 750 mm (29.5 in), height: 440 mm (17.3 in).
Weight	Minimum configuration: 25.0 kg (55.1 lb), maximum: 39.8 kg (87.7lb).

The x3500 M4 servers are shipped with the following items:

- Statement of Limited Warranty
- Important Notices
- Registration flyer
- IBM Systems Director Flyer
- Documentation CD that contains the *Installation and User's Guide*
- One 2.8 m C13 line cord (country-specific)

Note: EMEA models do not contain line cord. It must be purchased separately.

Standard models

The following table lists the standard models.

Table 2. Standard models (Part 1: Intel Xeon processor E5-2600 v2 product family)

MTM*	Intel Xeon processors† (two maximum)	Memory	RAID	Drive bays (std / max)	Drives	GbE	I/O slots (std / max)	Optical	Power supply (std / max)
Models announced September 2013									
7383-A5x	1x E5-2603 v2 4C 1.8GHz 10MB 1333MHz 80W	1x 4GB 1600MHz§	M1115	8x 2.5" HS / 32	Open bay	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-B5x	1x E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	1x 4GB 1600MHz§	M1115	8x 2.5" HS / 32	Open bay	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-C5x	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M1115	8x 2.5" HS / 32	Open bay	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-C7x	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M1115	8x 3.5" HS / 8	Open bay	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-C9x‡	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M5110 1GB Flash	8x 3.5" HS / 8	Open bay	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-D5x	1x E5-2630 v2 6C 2.6GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M1115	8x 2.5" HS / 32	Open bay	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-F5x	1x E5-2640 v2 8C 2.0GHz 20MB 1600MHz 95W	1x 8GB 1600MHz	M5110 512MB Flash	8x 2.5" HS / 32	Open bay	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-G5x	1x E5-2650 v2 8C 2.6GHz 20MB 1866MHz 95W	2x 4GB 1866MHz	M5110 1GB Flash	8x 2.5" HS / 32	Open bay	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-G9x‡	1x E5-2650 v2 8C 2.6GHz 20MB 1866MHz 95W	2x 4GB 1866MHz	M5110 1GB Flash	8x 2.5" HS / 32	Open bay	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-H5x	1x E5-2670 v2 10C 2.5GHz 25MB 1866MHz 115W	2x 4GB 1866MHz	M5110 1GB Flash	8x 2.5" HS / 32	Open bay	4	8 / 8	DVD-ROM	1x 900W HS / 2
7383-J5x	1x E5-2680 v2 10C 2.8GHz 25MB 1866MHz 115W	2x 4GB 1866MHz	M5110 1GB Flash	8x 2.5" HS / 32	Open bay	4	8 / 8	DVD-ROM	1x 900W HS / 2

* x in the Machine Type Model (MTM) represents a country-specific letter (for example, the EMEA MTM is 7983-A5G, and the US MTM is 7383-A5U). Ask an IBM representative for specifics.
† Processor detail: Processor quantity and model, cores, core speed, L3 cache, memory speed, TDP.
§ For models A5x and B5x, the standard DIMM is rated at 1600 MHz, but operates at up to 1333 MHz to match the processor memory speed. Actual memory speed maximums depend on several factors, as described in "Memory options".
‡ Rack-mount models.

Table 2. Standard models (Part 2: Intel Xeon processor E5-2600 product family)

Model	Intel Xeon processors† (2 maximum)	Memory	RAID	Disk bays	Disks	GbE	DVD	Power
Models announced March 2012								
7383-A2x	1x E5-2603 4C 1.8GHz 10MB 1066MHz 80W	1x 4 GB	M1115	8x 2.5" HS / 32	Open	4	DVD-ROM	1x 750W
7383-B2x	1x E5-2609 4C 2.4GHz 10MB 1066MHz 80W	1x 4 GB	M1115	8x 2.5" HS / 32	Open	4	DVD-ROM	1x 750W
7383-C2x	1x E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M1115	8x 2.5" HS / 32	Open	4	DVD-ROM	1x 750W
7383-C4x	1x E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M1115	8x 3.5" HS / 8	Open	4	DVD-ROM	1x 750W
7383-D2x	1x E5-2630 6C 2.3GHz 15MB 1333MHz 95W	1x 8 GB	M1115	8x 2.5" HS / 32	Open	4	DVD-ROM	1x 750W
7383-F2x	1x E5-2640 6C 2.5GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB (f)	8x 2.5" HS / 32	Open	4	DVD-ROM	1x 750W
7383-G2x	1x E5-2650 8C 2.0GHz 20MB 1600MHz 95W	1x 8 GB	M5110 1GB (f)	8x 2.5" HS / 32	Open	4	DVD-ROM	1x 900W
7383-H2x	1x E5-2670 8C 2.6GHz 20MB 1600MHz 115W	1x 8 GB	M5110 1GB (f)	8x 2.5" HS / 32	Open	4	DVD-ROM	1x 900W
7383-J2x	1x E5-2680 8C 2.7GHz 20MB 1600MHz 130W	1x 8 GB	M5110 1GB (f)	8x 2.5" HS / 32	Open	4	DVD-ROM	1x 900W

† Processor detail: Processor quantity and model, number of cores, core speed, L3 cache, memory speed, power consumption.
(f) The ServeRAID M5110 RAID controller in this model includes flash-backed cache. The cache size is 512 MB or 1 GB, as indicated.

Refer to the Specifications section for information about standard features of the server.

Express models

The following table lists the express models.

Table 3. Express models (Part 1: Intel Xeon processor E5-2600 v2 product family)

MTM**	Intel Xeon processors† (two maximum)	Memory	RAID	Drive bays (std / max)	Drives	GbE	I/O slots (std / max)	Optical	Power supply (std / max)
United States, Canada, Latin America									
7383-EGU	1x E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	1x 8GB 1600MHz§	M1115	8x 3.5" HS / 8	Open bay	4	8 / 8	Multi-burner	1x 750W HS / 2
7383-EHU	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M5110	8x 3.5" HS / 8	Open bay	4	8 / 8	Multi-burner	1x 750W HS / 2
7383-EJU	1x E5-2630 v2 6C 2.6GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M5110	8x 2.5" HS / 32	Open bay	4	8 / 8	Multi-burner	1x 750W HS / 2
7383-EKU	1x E5-2640 v2 8C 2.0GHz 20MB 1600MHz 95W	1x 8GB 1600MHz	M5110	8x 2.5" HS / 32	Open bay	4	8 / 8	Multi-burner	1x 750W HS / 2
Latin America (Brazil only)									
7383-EPP	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M1115	8x 3.5" HS / 8	2x 500GB NL SATA	4	8 / 8	DVD-ROM	2x 550W HS / 2
7383-EQP	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M1115	8x 2.5" HS / 32	2x 300GB 10K	4	8 / 8	DVD-ROM	2x 550W HS / 2
Asia Pacific (China only)									
7383-ELC	1x E5-2603 v2 4C 1.8GHz 10MB 1333MHz 80W	1x 8GB 1600MHz§	M5110	8x 2.5" HS / 32	1x 300GB 10K	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-ERC	1x E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	1x 8GB 1600MHz§	M5110	8x 2.5" HS / 32	1x 300GB 10K	4	8 / 8	DVD-ROM	1x 750W HS / 2
7383-ESC	1x E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	2x 8GB 1600MHz§	M5110	8x 2.5" HS / 32	Open bay	4	8 / 8	DVD-ROM	2x 900W HS / 2
7383-ETC	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M5110	8x 2.5" HS / 32	1x 300GB 10K	4	8 / 8	DVD-ROM	1x 750W HS / 2
Europe									
7383-E7G	1x E5-2603 v2 4C 1.8GHz 10MB 1333MHz 80W	1x 4GB 1600MHz§	M1115	8x 3.5" HS / 8	Open bay	4	8 / 8	Multi-burner	1x 550W HS / 2
7383-E8G	1x E5-2603 v2 4C 1.8GHz 10MB 1333MHz 80W	1x 4GB 1600MHz§	M1115 RAID 5	8x 2.5" HS / 32	Open bay	4	8 / 8	Multi-burner	1x 550W HS / 2
7383-E9G	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M5110 512MB (c)	8x 2.5" HS / 32	Open bay	4	8 / 8	Multi-burner	2x 550W HS / 2
7383-K6G	1x E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	1x 4GB 1600MHz§	M5110 512MB (f)	8x 2.5" HS / 32	Open bay	4	8 / 8	Multi-burner	1x 550W HS / 2
7383-K7G	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M5110 512MB (f)	8x 2.5" HS / 32	3x 300GB 10K	4	8 / 8	Multi-burner	1x 750W HS / 2

Table 3. Express models (Part 1: Intel Xeon processor E5-2600 v2 product family) (continued)

MTM**	Intel Xeon processors† (two maximum)	Memory	RAID	Drive bays (std / max)	Drives	GbE	I/O slots (std / max)	Optical	Power supply (std / max)
Central and Eastern Europe (CEE) and Middle East and Africa (MEA)									
7383-E9G	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M5110 512MB (c)	8x 2.5" HS / 32	Open bay	4	8 / 8	Multi-burner	2x 550W HS / 2
7383-K6G	1x E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	1x 4GB 1600MHz§	M5110 512MB (f)	8x 2.5" HS / 32	Open bay	4	8 / 8	Multi-burner	1x 550W HS / 2
7383-K7G	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M5110 512MB (f)	8x 2.5" HS / 32	3x 300GB 10K	4	8 / 8	Multi-burner	1x 750W HS / 2
Russia/Commonwealth of Independent States (CIS)									
7383-E7G	1x E5-2603 v2 4C 1.8GHz 10MB 1333MHz 80W	1x 4GB 1600MHz§	M1115	8x 3.5" HS / 8	Open bay	4	8 / 8	Multi-burner	1x 550W HS / 2
7383-EMG	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M5110 512MB (f)	8x 2.5" HS / 32	Open bay	4	8 / 8	Multi-burner	1x 550W HS / 2
7383-K6G	1x E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	1x 4GB 1600MHz§	M5110 512MB (f)	8x 2.5" HS / 32	Open bay	4	8 / 8	Multi-burner	1x 550W HS / 2
7383-K7G	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	M5110 512MB (f)	8x 2.5" HS / 32	3x 300GB 10K	4	8 / 8	Multi-burner	1x 750W HS / 2

** MTM = Machine Type Model
† Processor detail: Processor quantity and model, number of cores, core speed, L3 cache, memory speed, TDP.
(c) The ServeRAID M5110 RAID controller in this model includes cache memory with optional battery backup.
(f) The ServeRAID M5110 RAID controller in this model includes flash-backed cache memory.
§ For these models, the standard DIMM is rated at 1600 MHz, but operates at up to 1333 MHz to match the processor memory speed. Actual memory speed maximums depend on several factors, as described in "Memory options".

Table 3. Express models (Part 2: Intel Xeon processor E5-2600 product family)

Model	Processor†	RAM	RAID	Disk bays	Disks	Network	Optical	Power
North America (NA), Latin America (LA)								
7383-EAU	1x Xeon E5-2609 4C 2.4GHz 10MB 1066MHz 80W	1x 4 GB	M1115	8x 3.5" HS / 8	Optional	4x GbE	Multi-burner	1x 750 W
7383-EBU	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB(f)	8x 3.5" HS / 8	Optional	4x GbE	Multi-burner	1x 750 W
7383-ECU	1x Xeon E5-2640 6C 2.5GHz 15MB 1333MHz 95W	2x 8 GB	M5110 512MB(f)	8x 2.5" HS / 32	Optional	4x GbE	Multi-burner	2x 750 W
7383-EDU	1x Xeon E5-2650 8C 2.0GHz 20MB 1600MHz 95W	1x 8 GB	M5110 1GB(f)	8x 2.5" HS / 32	Optional	4x GbE	Multi-burner	1x 750 W
Europe								
7383-E1G	1x Xeon E5-2603 4C 1.8GHz 10MB 1066MHz 80W	1x 4 GB	M1115	8x 3.5" HS / 8	Optional	4x GbE	Multi-burner	1x 750 W
7383-E2G	1x Xeon E5-2603 4C 1.8GHz 10MB 1066MHz 80W	1x 4 GB	M1115	8x 2.5" HS / 32	Optional	4x GbE	Multi-burner	1x 750 W
7383-E3G	1x Xeon E5-2609 4C 2.4GHz 10MB 1066MHz 80W	1x 4 GB	M5110 512MB	8x 2.5" HS / 32	2x 300GB 10k 2.5" SAS	4x GbE	Multi-burner	1x 750 W
7383-E4G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB	8x 2.5" HS / 32	Optional	4x GbE	Multi-burner	2x 750 W
7383-E5G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB(f)	8x 3.5" HS / 8	Optional	4x GbE	Multi-burner	1x 750 W
7383-E6G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB(f)	8x 2.5" HS / 32	2x 300GB 10k 2.5" SAS	4x GbE	Multi-burner	1x 750 W

Table 3. Express models (Part 2: Intel Xeon processor E5-2600 product family) (continued)

Model	Processor†	RAM	RAID	Disk bays	Disks	Network	Optical	Power
Central and Eastern Europe (CEE) and Middle East & Africa (MEA)								
7383-E1G	1x Xeon E5-2603 4C 1.8GHz 10MB 1066MHz 80W	1x 4 GB	M1115	8x 3.5" HS / 8	Optional	4x GbE	Multi-burner	1x 750 W
7383-E2G	1x Xeon E5-2603 4C 1.8GHz 10MB 1066MHz 80W	1x 4 GB	M1115	8x 2.5" HS / 32	Optional	4x GbE	Multi-burner	1x 750 W
7383-E3G	1x Xeon E5-2609 4C 2.4GHz 10MB 1066MHz 80W	1x 4 GB	M5110 512MB	8x 2.5" HS / 32	2x 300GB 10k 2.5" SAS	4x GbE	Multi-burner	1x 750 W
7383-E5G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB(f)	8x 3.5" HS / 8	Optional	4x GbE	Multi-burner	1x 750 W
7383-E6G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB(f)	8x 2.5" HS / 32	2x 300GB 10k 2.5" SAS	4x GbE	Multi-burner	1x 750 W
7383-K1G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB(f)	8x 2.5" HS / 32	3x 300GB 10k 2.5" SAS	4x GbE	Multi-burner	2x 750 W
7383-K3G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB(b)	8x 2.5" HS / 32	Optional	4x GbE	Multi-burner	2x 750 W
Russia/Commonwealth of Independent States (CIS)								
7383-E1G	1x Xeon E5-2603 4C 1.8GHz 10MB 1066MHz 80W	1x 4 GB	M1115	8x 3.5" HS / 8	Optional	4x GbE	Multi-burner	1x 750 W
7383-K2G	1x Xeon E5-2609 4C 2.4GHz 10MB 1066MHz 80W	1x 4 GB	M5110 512MB(b)	8x 2.5" HS / 32	Optional	4x GbE	Multi-burner	1x 750 W
7383-K3G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB(b)	8x 2.5" HS / 32	Optional	4x GbE	Multi-burner	2x 750 W
7383-K4G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110 512MB(f)	8x 2.5" HS / 32	Optional	4x GbE	Multi-burner	2x 750 W

† Processor detail: Processor quantity and model, number of cores, core speed, L3 cache, memory speed, thermal design power.
(f) The ServeRAID M5110 RAID controller in this model includes flash-backed cache. The cache size is 512 MB or 1 GB, as indicated.
(b) The ServeRAID M5110 RAID controller in this model includes battery-backed cache. The cache size is 512 MB or 1 GB, as indicated.

Processor options

The x3500 M4 supports the processor options listed in the following table. The server supports up to two processors. This table shows which server models have each processor standard. If there is no corresponding *where-used* model for a particular processor, then this processor is only available through CTO.

Table 4. Processor options (Part 1: Intel Xeon processor E5-2600 v2 product family)

Part number	Feature codes*	Description	Standard models where used
46W9128	A3YB / A3XT	Intel Xeon Processor E5-2603 v2 4C 1.8GHz 10MB Cache 1333MHz 80W	A5x
46W9129	A3YC / A3XU	Intel Xeon Processor E5-2609 v2 4C 2.5GHz 10MB Cache 1333MHz 80W	B5x
46W9130	A3YDA3XV	Intel Xeon Processor E5-2620 v2 6C 2.1GHz 15MB Cache 1600MHz 80W	C5x, C7x, C9x
00Y8265	A476 / A474	Intel Xeon Processor E5-2628L v2 8C 1.9GHz 20MB Cache 1600MHz 70W	-
46W9131	A3YE / A3XW	Intel Xeon Processor E5-2630 v2 6C 2.6GHz 15MB Cache 1600MHz 80W	D5x
46W9142	A3YR / A3Y7	Intel Xeon Processor E5-2630L v2 6C 2.4GHz 15MB Cache 1600MHz 60W	-
46W9139	A3YN / A3Y4	Intel Xeon Processor E5-2637 v2 4C 3.5GHz 15MB Cache 1866MHz 130W	-
46W9132	A3YF / A3XX	Intel Xeon Processor E5-2640 v2 8C 2.0GHz 20MB Cache 1600MHz 95W	F5x
46W9140	A3YP / A3Y5	Intel Xeon Processor E5-2643 v2 6C 3.5GHz 25MB Cache 1866MHz 130W	-
00Y8266	A477 / A475	Intel Xeon Processor E5-2648L v2 10C 1.9GHz 25MB Cache 1866MHz 70W	-
46W9133	A3YG / A3XY	Intel Xeon Processor E5-2650 v2 8C 2.6GHz 20MB Cache 1866MHz 95W	G5x, G9x
46W9143	A3YS / A3Y8	Intel Xeon Processor E5-2650L v2 10C 1.7GHz 25MB Cache 1600MHz 70W	-
46W9134	A3YH / A3XZ	Intel Xeon Processor E5-2660 v2 10C 2.2GHz 25MB Cache 1866MHz 95W	-
46W9141	A3YQ / A3Y6	Intel Xeon Processor E5-2667 v2 8C 3.3GHz 25MB Cache 1866MHz 130W	-
46W9135	A3YJ / A3Y0	Intel Xeon Processor E5-2670 v2 10C 2.5GHz 25MB Cache 1866MHz 115W	H5x
46W9136	A3YK / A3Y1	Intel Xeon Processor E5-2680 v2 10C 2.8GHz 25MB Cache 1866MHz 115W	J5x
46W9137	A3YL / A3Y2	Intel Xeon Processor E5-2690 v2 10C 3.0GHz 25MB Cache 1866MHz 130W	-
46W9126	A3Y9 / A3XR	Intel Xeon Processor E5-2695 v2 12C 2.4GHz 30MB Cache 1866MHz 115W	-
46W9127	A3YA / A3XS	Intel Xeon Processor E5-2697 v2 12C 2.7GHz 30MB Cache 1866MHz 130W	-

* The first feature code is for the first processor; the second feature code is for the second processor

Table 4. Processor options (Part 2: Intel Xeon processor E5-2600 product family)

Part number	Feature codes*	Description	Standard models where used
Intel Xeon processor E5-2600 product family			
90Y5942	A1GP / A1GP	Intel Xeon Processor E5-2603 4C 1.8GHz 10MB Cache 1066MHz 80W	A2x
90Y5944	A1GR / A1GR	Intel Xeon Processor E5-2609 4C 2.4GHz 10MB Cache 1066MHz 80W	B2x
90Y5945	A1GS / A1GS	Intel Xeon Processor E5-2620 6C 2.0GHz 15MB Cache 1333MHz 95W	C2x, C4x
90Y5946	A1GT / A1GT	Intel Xeon Processor E5-2630 6C 2.3GHz 15MB Cache 1333MHz 95W	D2x
90Y5953	A1H0 / A1H0	Intel Xeon Processor E5-2630L 6C 2.0GHz 15MB Cache 1333MHz 60W	-
94Y7342	A2CT / A2CT	Intel Xeon Processor E5-2637 2C 3.0GHz 5MB Cache 1600MHz 80W	-
90Y5947	A1GU / A1GU	Intel Xeon Processor E5-2640 6C 2.5GHz 15MB Cache 1333MHz 95W	F2x
94Y7341	A2CS / A2CS	Intel Xeon Processor E5-2643 4C 3.3GHz 10MB Cache 1600MHz 130W	-
00D4474	A393 / A393	Intel Xeon Processor E5-2648L 8C 1.8GHz 20MB Cache 1600MHz 70W	-
90Y5948	A1GV / A1GV	Intel Xeon Processor E5-2650 8C 2.0GHz 20MB Cache 1600MHz 95W	G2x
90Y5954	A1H1 / A1H1	Intel Xeon Processor E5-2650L 8C 1.8GHz 20MB Cache 1600MHz 70W	-
00D4473	A392 / A392	Intel Xeon Processor E5-2658 8C 2.1GHz 20MB Cache 1600MHz 95W	-
90Y5949	A1GW / A1GW	Intel Xeon Processor E5-2660 8C 2.2GHz 20MB Cache 1600MHz 95W	-
94Y7442	A2H6 / A2H6	Intel Xeon Processor E5-2665 8C 2.4GHz 20MB Cache 1600MHz 115W	-
90Y5951	A1GY / A1GY	Intel Xeon Processor E5-2667 6C 2.9GHz 15MB Cache 1600MHz 130W	-
90Y5955	A1H2 / A1H2	Intel Xeon Processor E5-2670 8C 2.6GHz 20MB Cache 1600MHz 115W	H2x
90Y5950	A1GX / A1GX	Intel Xeon Processor E5-2680 8C 2.7GHz 20MB Cache 1600MHz 130W	J2x
94Y7343	A2CU / A2CU	Intel Xeon Processor E5-2690 8C 2.9GHz 20MB Cache 1600MHz 135W	-

* The first feature code is for the first processor; the second feature code is for the second processor

Memory options

IBM DDR3 memory is compatibility tested and tuned for optimal System x performance and throughput. IBM memory specifications are integrated into the light path diagnostics for immediate system performance feedback and optimum system uptime. From a service and support standpoint, IBM memory automatically assumes the IBM system warranty, and IBM provides service and support worldwide.

The IBM System x3500 M4 supports DDR3 memory. The server supports up to 12 DIMMs when one processor is installed and up to 24 DIMMs when two processors are installed. Each processor has four memory channels, and there are three DIMMs per channel.

The following rules apply when selecting the memory configuration:

- The server supports UDIMMs, RDIMMs, and LRDIMMs.
- Mixing different types of memory (UDIMMs, RDIMMs, and LRDIMMs) is not supported.
- Mixing 1.5 V and 1.35 V DIMMs in the same server is supported. In such a case all DIMMs operate at 1.5 V.
- The maximum number of ranks per channel is eight (with the exception of Load Reduced DIMMs, where more than eight ranks are supported because one quad-rank LRDIMM provides the same electrical load on a memory bus as a single-rank RDIMM).
- The maximum quantity of DIMMs that can be installed in a server depends on the number of CPUs, DIMM type, rank, and operating voltage, as shown in the "Max. qty supported" row in Table 5.
- All DIMMs in the server operate at the same speed, which is determined as the lowest value of:
  - Memory speed supported by specific CPU
  - Lowest maximum operating speed for the selected memory configuration that depends on rated speed, operating voltage, and quantity of DIMMs per channel, as shown in the "Max. operating speed" section in Table 5

Table 5. Maximum memory speeds (Part 1: Intel Xeon processor E5-2600 v2 product family - RDIMMs)

DIMM specification	**RDIMM**				
Rank	Single rank		Dual rank		
Part numbers	00D5024 (4 GB) 00D5036 (8 GB)		00D5044 (8 GB)		00D5028 (4 GB) 00D5048 (16 GB)
Rated speed	1600 MHz		1600 MHz		1866 MHz
Rated voltage	1.35 V		1.35 V		1.5 V
Operating voltage	1.35 V	1.5 V	1.35 V	1.5 V	1.5 V
Max qty supported*	24	24	24	24	24
Max DIMM capacity	8 GB	8 GB	8 GB	8 GB	16 GB
Max memory capacity	192 GB	192 GB	192 GB	192 GB	384 GB
Max. memory at rated speed	None	128 GB	None	128 GB	128 GB
Maximum operating speed					
1 DIMM per channel	1333 MHz	1600 MHz	1333 MHz	1600 MHz	1866 MHz
2 DIMMs per channel	1333 MHz	1600 MHz	1333 MHz	1600 MHz	1600 MHz
3 DIMMs per channel	800 MHz	1066 MHz	800 MHz	1066 MHz	1066 MHz

* The maximum quantity that is supported is shown for two processors installed.

Table 5. Maximum memory speeds (Part 2: Intel Xeon processor E5-2600 v2 product family - UDIMMs and LRDIMMs)

DIMM specification	UDIMM		LRDIMM
Rank	Dual rank		Quad rank
Part number	00D5012 (4 GB) 00D5016 (8 GB)		46W0761 (32 GB)*
Rated speed	1600 MHz		1866 MHz
Rated voltage	1.35 V		1.5 V
Operating voltage	1.35 V	1.5 V	1.5 V
Max. qty supported**	16	16	24
Max. DIMM capacity	8 GB	8 GB	32 GB
Max. memory capacity	128 GB	128 GB	768 GB
Max. memory at rated speed	None	128 GB	256 GB
Maximum operating speed			
1 DIMM per channel	1333 MHz	1600 MHz	1866 MHz
2 DIMMs per channel	1333 MHz	1600 MHz	1600 MHz
3 DIMMs per channel	No support	No support	1066 MHz

* Support is planned for earlier in 2014.
** Maximum quantity supported is shown for two processors installed.

Table 5. Maximum memory speeds (Part 3: Intel Xeon processor E5-2600 product family - RDIMMs)

DIMM specification	RDIMM							
Rank	Single rank			Dual rank			Quad rank	
Part number	49Y1405 (1 GB) 49Y1406 (2 GB)		49Y1559 (4 GB)	49Y1407 (4 GB) 49Y1397 (8 GB) 49Y1563 (16 GB)		90Y3178 (4 GB) 90Y3109 (8 GB) 00D4968 (16 GB)	49Y1400 (16 GB)	
Rated speed	1333 MHz		1600 MHz	1333 MHz		1600 MHz	1066 MHz	
Rated voltage	1.35 V		1.5 V	1.35 V		1.5 V	1.35 V	
Operating voltage	1.35 V	1.5 V	1.5 V	1.35 V	1.5 V	1.5 V	1.35 V	1.5 V
Max. qty supported*	16	24	24	16	24	24	16	16
Max. DIMM capacity	4 GB	4 GB	4 GB	16 GB	16 GB	16 GB	16 GB	16 GB
Max. memory capacity	64 GB	96 GB	96 GB	256 GB	384 GB	384 GB	256 GB	256 GB
Max. memory at rated speed	64 GB	64 GB	64 GB	256 GB	256 GB	256 GB	NS**	128 GB
Maximum operating speed								
1 DIMM per channel	1333 MHz	1333 MHz	1600 MHz	1333 MHz	1333 MHz	1600 MHz	800 MHz	1066 MHz
2 DIMMs per channel	1333 MHz	1333 MHz	1600 MHz	1333 MHz	1333 MHz	1600 MHz	800 MHz	800 MHz
3 DIMMs per channel	NS**	1066 MHz	1066 MHz	NS**	1066 MHz	1066 MHz	NS**	NS**

* The maximum quantity supported is shown for two processors installed.
** NS = Not supported.

Table 5. Maximum memory speeds (Part 4: Intel Xeon processor E5-2600 product family - UDIMMs and LRDIMMs)

DIMM specification	UDIMM		LRDIMM	
Rank	Dual rank		Quad rank	
Part number	49Y1403 (4 GB) 49Y1404 (8 GB)		90Y3105 (32 GB)	
Rated speed	1333 MHz		1333 MHz	
Rated voltage	1.35 V		1.35 V	
Operating voltage	1.35 V	1.5 V	1.35 V	1.5 V
Max. qty supported*	16	16	24	24
Max. DIMM capacity	4 GB	4 GB	32 GB	32 GB
Max. memory capacity	64 GB	64 GB	768 GB	768 GB
Max. memory at rated speed	64 GB	64 GB	256 GB	512 GB
Maximum operating speed				
1 DIMM per channel	1333 MHz	1333 MHz	1333 MHz	1333 MHz
2 DIMMs per channel	1333 MHz	1333 MHz	1066 MHz	1333 MHz
3 DIMMs per channel	Not supported	Not supported	1066 MHz	1066 MHz

* The maximum quantity supported is shown for two processors installed. When one processor installed the maximum quantity supported is a half of that shown.

The following memory protection technologies are supported:

- ECC
- Chipkill (for x4-based memory DIMMs)
- Memory mirroring
- Memory sparing

Chipkill works only in independent channel mode (default operational mode) and supports only x4-based memory DIMMs.

If memory mirroring is used, then DIMMs must be installed in pairs (minimum of one pair per CPU), and both DIMMs in a pair must be identical in type and size.

If memory rank sparing is used, then a minimum of one quad-rank DIMM or two single-rank or dual-rank DIMMs must be installed per populated channel (the DIMMs do not need being identical). In rank sparing mode, one rank of a DIMM in each populated channel is reserved as spare memory. The size of a rank varies depending on the DIMMs installed.

Note: Chipkill, memory mirroring, and memory rank sparing modes are mutually exclusive. Only one operational memory mode can be enabled on a server, and it is a system-wide setting.

The following table lists memory options available for the x3500 M4 server.

Table 6. Memory options (Part 1: Intel Xeon processor E5-2600 v2 product family)

Part number	Feature code	Description	Maximum supported	Standard models where used
UDIMMs				
00D5012	A3QB	4GB (1x4GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP UDIMM	16 (8 per CPU)	-
00D5016	A3QC	8GB (1x8GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP UDIMM	16 (8 per CPU)	-
RDIMMs - 1600 MHz				
00D5024	A3QE	4GB (1x4GB, 1Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	A5x, B5x
00D5036	A3QH	8GB (1x8GB, 1Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	-
00D5044	A3QK	8GB (1x8GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	C5, C7x, C9x, D5x, F5x
RDIMMs - 1866 MHz				
00D5028	A3QF	4GB (1x4GB, 2Rx8, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP RDIMM	24 (12 per CPU)	G5x, G9x, H5x, J5x
00D5048	A3QL	16GB (1x16GB, 2Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP RDIMM	24 (12 per CPU)	-
LRDIMMs (support is planned for earlier in 2014)				
46W0761	A47K	32GB (1x32GB, 4Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP LRDIMM	24 (12 per CPU)	-

Table 6. Memory options (Part 2: Intel Xeon processor E5-2600 product family)

Part number	Feature code	Description	Maximum quantity supported	Standard models where used
UDIMMs				
49Y1403	A0QS	2GB (1x2GB, 1Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP UDIMM	16 (8 per CPU)	-
49Y1404	8648	4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP UDIMM	16 (8 per CPU)	-
RDIMMs				
49Y1405	8940	2GB (1x2GB, 1Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	24 (12 per CPU)	-
49Y1406	8941	4GB (1x4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	24 (12 per CPU)	-
49Y1559	A28Z	4GB (1x4GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	-
49Y1407	8942	4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	24 (12 per CPU)	A2x, B2x
90Y3178	A24L	4GB (1x4GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	-
49Y1397	8923	8GB (1x8GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC 1333 MHz LP RDIMM	24 (12 per CPU)	C2x, C4x, D2x, F2x, G2x, H2x, J2x
90Y3109	A292	8GB (1x8GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	-
49Y1563	A1QT	16GB (1x16GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	24 (12 per CPU)	-
00D4968	A2U5	16GB (1x16GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	-
49Y1400	8939	16GB (1x16GB, 4Rx4, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz LP RDIMM	16 (8 per CPU)	-
LRDIMMs				
90Y3105	A291	32GB (1x32GB, 4Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP LRDIMM	24 (12 per CPU)	-

Internal storage

The IBM System x3500 M4 server supports the following internal storage configurations:

- 6 Gb SAS/SATA
  - 8x 3.5" Simple Swap SATA hard drive bays (only available in CTO)
  - 8x 3.5" hot-swap SAS/SATA hard drive bays
  - 8x 3.5" hot-swap SAS/SATA drive bays + 8x 2.5" Slim-SFF SAS/SATA hot-swap drive bays (only available in CTO, requires two RAID controllers)
  - 8x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
  - 16x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
  - 24x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
  - 32x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
- 12 Gb SAS/SATA (support is planned for later in 2013)
  - 8x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays (CTO only)
  - 16x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
  - 24x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
  - 32x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays

Figure 5 shows these configurations.

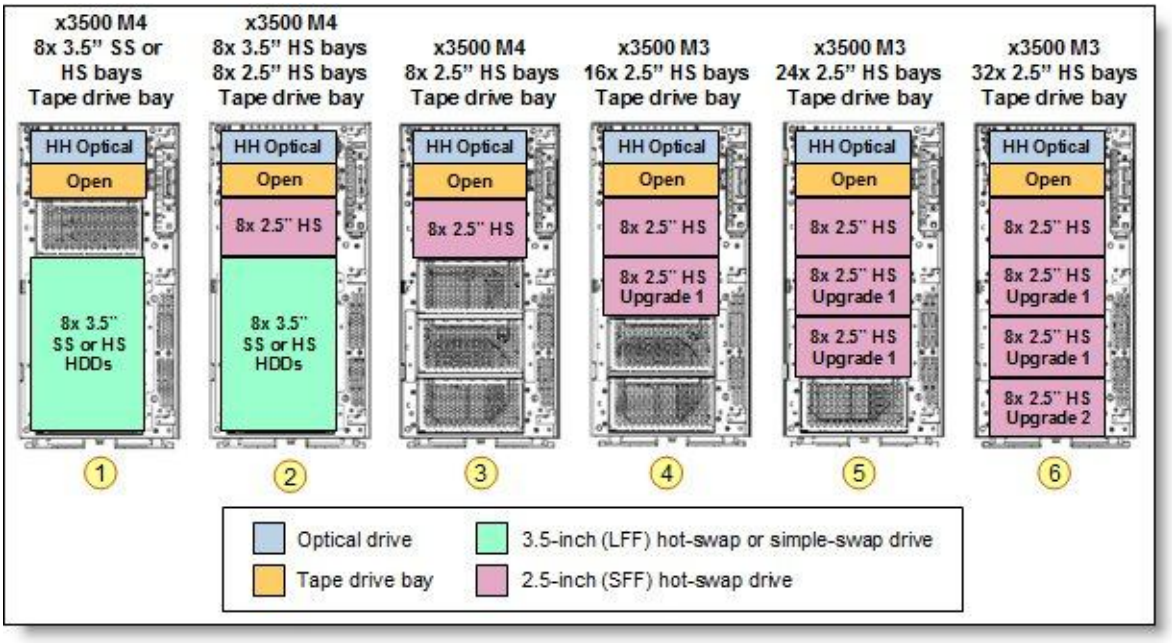

Figure 5. Internal drive configurations

Backplanes

Standard models of x3500 M4 ship with eight (all models except C4x, C7x, and C9x) 2.5" Slim-SFF SAS/SATA hot-swap drive bays. Models C4x, C7x, and C9x ship with eight 3.5" SAS/SATA hot-swap hard drive bays. The following table shows internal storage expansion options available for the x3500 M4.

Table 7. Internal storage expansion options

Part number	Feature code	Name	Max qty supported
6 Gb SAS/SATA internal drive connectivity			
94Y5978	A1WZ	Additional 8 x 2.5” Hot-Swap SAS/SATA Upgrade Kit for 16 or 24 HDDs (shown in Figure 5 as an Upgrade 1 used in configurations 4, 5, and 6)	2
81Y7010	A1FW	Additional 8 x 2.5" Hot-Swap SAS/SATA Upgrade Kit for 32 HDDs (shown in Figure 5 as an Upgrade 2 used in configuration 6)	1
12 Gb SAS internal drive connectivity (support is planned for later in 2013)			
46W9242	A47B	Add'l 8x 2.5" Hot-Swap SAS/SATA Upgrade Kit for 16 or 24 HDDs (12Gb) (shown in Figure 5 as an Upgrade 1 used in configurations 4, 5, and 6)	2
46W9243	A47A	Add'l 8x 2.5" Hot-Swap SAS/SATA Upgrade Kit for 32 HDDs (12Gb) (shown in Figure 5 as an Upgrade 2 used in configuration 6)	1
46W9244	A478	SAS cable option for Two 12Gb RAID cards	1

These options are used as follows:

- 6 Gb SAS/SATA internal drive connectivity:
  - 94Y5978 upgrades models with eight hot-swap 2.5" drive bays to 16 hot-swap 2.5" drive bays or models with 16 hot-swap 2.5" drive bays to 24 hot-swap 2.5" drive bays. This option includes a SAS expander card that is mounted on an HDD backplane, and does not consume a PCIe slot.
  - 81Y7010 upgrades models with 24 hot-swap 2.5" drive bays to 32 hot-swap 2.5" drive bays. This option does not include an SAS expander.
  - Configurations 4, 5, and 6 shown in Figure 5 can be implemented with one or two RAID controllers (M1115 or M5110). Configuration 2 requires two RAID controllers.
- 12 Gb SAS/SATA internal drive connectivity (support planned for 1Q/2014):
  - 46W9242 upgrades 12 Gb SAS/SATA models with eight hot-swap 2.5" drive bays (CTO only) to 16 hot-swap 2.5" drive bays or 12 Gbps SAS/SATA models with 16 hot-swap 2.5" drive bays to 24 hot-swap 2.5" drive bays. This option includes a SAS expander card that is mounted on an HDD backplane, and does not consume a PCIe slot.
  - 46W9243 upgrades 12 Gb SAS/SATA models models with 24 hot-swap 2.5" drive bays to 32 hot-swap 2.5" drive bays. This option does not include an SAS expander.
  - Configurations 3 and 4 shown in Figure 5 can be implemented with one N2215 SAS/SATA HBA or one or two ServeRAID M5210 SAS/SATA Controllers.
  - Configurations 5 and 6 shown in Figure 5 can be implemented with one or two ServeRAID M5210 SAS/SATA Controllers.
  - If the second M5210 controller is used, SAS cable option (46W9244) must be ordered.
  - Configurations 1 and 2 are not supported.
- 6 Gb SAS/SATA and 12 Gb SAS/SATA configurations are mutually exclusive.

As shown in Figure 5, each configuration supports an optical drive and a tape drive. All standard configurations ship with DVD-ROM optical drive. For configure-to-order (CTO) configurations, you can add a tape drive instead of an optical drive if so desired.

Controllers for internal storage

The following table lists the RAID controllers and additional options used for internal disk storage of the x3500 M4 server.

Table 8. RAID controllers and HBAs for internal storage (Part 1: 6 Gbps SAS/SATA)

Part number	Feature code	Description	Max quantity supported	Standard models where used
81Y4448	A1MZ	ServeRAID M1115 SAS/SATA Controller	2	A2x, B2x, C2x, C4x, D2x, A5x, B5x, C5x, C7x, D5x
81Y4542	A1X1	ServeRAID M1100 Series Zero Cache/RAID 5 Upgrade	1*	-
81Y4481	A347	ServeRAID M5110 SAS/SATA Controller	2	C9x, F2x, G2x, H2x, J2x, F5x, G5x, G9x, H5x, J5x
81Y4544	A1X2	ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade	1*	-
81Y4484	A1J3	ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade	2	-
81Y4487	A1J4	ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade	2	F2x, F5x
81Y4559	A1WY	ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade	2	C9x, G2x, H2x, J2x, G5x, G9x, H5x, J5x
81Y4508	A22E	ServeRAID M5100 Series Battery Kit	2**	-
81Y4546	A1X3	ServeRAID M5100 Series RAID 6 Upgrade	1*†	-
90Y4273	A2MC	ServeRAID M5100 Series SSD Performance Accelerator	1*	-
90Y4318	A2MD	ServeRAID M5100 Series SSD Caching Enabler	1*	-
46M0912	3876	IBM 6Gb Performance Optimized HBA	1	-
46C8988	A3MW	N2115 SAS/SATA HBA for IBM System x	1	

* Only one M1100 or M5100 Series FoD software license is required per server.
** The ServeRAID M5100 Series Battery Kit (81Y4508) is only supported with ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade (81Y4484).
† The ServeRAID M5100 Series RAID 6 Upgrade (81Y4546) requires 512 MB or 1 GB cache upgrades.

Table 8. RAID controllers and HBAs for internal storage (Part 2: 12 Gbps SAS/SATA) (support planned for 1Q/2014)

Part number	Feature code	Description	Maximum supported	Standard models where used
46C9110	A3YZ	ServeRAID M5210 SAS/SATA Controller	2	-
47C8675	A3YY	N2215 SAS/SATA HBA for IBM System x	1	-
Hardware upgrades for the M5210				
47C8656	A3Z0	ServeRAID M5200 Series 1GB Cache/RAID 5 Upgrade	1	-
47C8660	A3Z1	ServeRAID M5200 Series 1GB Flash/RAID 5 Upgrade	1	-
47C8664	A3Z2	ServeRAID M5200 Series 2GB Flash/RAID 5 Upgrade	1	-
Feature on Demand upgrades for the M5210				
47C8708	A3Z6	ServeRAID M5200 Series Zero Cache/RAID 5 Upgrade	1	-
47C8706	A3Z5	ServeRAID M5200 Series RAID 6 Upgrade	1*	-
47C8710	A3Z7	ServeRAID M5200 Series Performance Accelerator	1*	-
47C8712	A3Z8	ServeRAID M5200 Series SSD Caching Enabler	1*	-

* Requires cache memory upgrade (47C8656, 47C8660, or 47C8664).

The ServeRAID M1115 SAS/SATA Controller has the following specifications:

- Eight internal 6 Gbps SAS/SATA ports
- Two x4 mini-SAS internal connectors (SFF-8087)
- Supports RAID levels 0, 1, and 10
- Supports RAID levels 5 and 50 with optional M1100 Series RAID 5 upgrades
- 6 Gbps throughput per port
- PCIe 3.0 x8 host interface
- Based on the LSI SAS2008 6 Gbps ROC controller

The ServeRAID M5110 SAS/SATA Controller has the following specifications:

- Eight internal 6 Gbps SAS/SATA ports
- Two x4 mini-SAS internal connectors (SFF-8087)
- Supports RAID levels 0, 1, and 10
- Supports RAID levels 5 and 50 with optional M5100 Series RAID 5 upgrades
- Supports RAID 6 and 60 with the optional M5100 Series RAID 6 Upgrade
- Supports 512 MB battery-backed cache or 512 MB or 1 GB flash-backed cache
- 6 Gbps throughput per port
- PCIe 3.0 x8 3 host interface
- Based on the LSI SAS2208 6 Gbps ROC controller

The ServeRAID M5210 SAS/SATA Controller has the following specifications:

- Eight internal 12 Gbps SAS/SATA ports
- Two x4 HD mini-SAS internal connectors (SFF-8643)
- Supports connections to SAS/SATA drives and SAS Expanders
- Supports RAID levels 0, 1, and 10
- Supports RAID levels 5 and 50 with optional M5200 Series RAID 5 upgrades
- Supports RAID 6 and 60 with the optional M5200 Series RAID 6 Upgrade
- Supports 1 GB non-backed cache or 1 GB or 2 GB flash-backed cache
- Up to 12 Gbps throughput per port
- PCIe 3.0 x8 host interface
- Based on the LSI SAS3108 12 Gbps ROC controller

The IBM 6Gb Performance Optimized HBA has the following specifications:

- Eight internal 6 Gbps SAS/SATA ports
- Two x4 mini-SAS internal connectors (SFF-8087)
- Supports connections SSDs (does not support HDDs in x3500 M4)
- Optimized for SSD performance
- No RAID support
- Up to 6 Gbps throughput per port
- PCIe 2.0 x8 host interface
- Based on the LSI SAS2008 6 Gbps controller

The IBM N2115 SAS/SATA HBA has the following specifications:

- Eight internal 6 Gbps SAS/SATA ports
- Two x4 mini-SAS internal connectors (SFF-8087)
- Supports connections to SSDs (does not support HDDs in x3500 M4)
- Optimized for SSD performance
- No RAID support
- Up to 6 Gbps throughput per port
- PCIe 3.0 x8 host interface
- Based on the LSI SAS2308 6 Gbps controller

The IBM N2215 SAS/SATA HBA has the following specifications:

- Eight internal 12 Gbps SAS/SATA ports
- Two x4 HD mini-SAS internal connectors (SFF-8643)
- Supports connections to SSDs (does not support HDDs in x3500 M4)
- Optimized for SSD performance
- No RAID support
- Up to 12 Gbps throughput per port
- PCIe 3.0 x8 host interface
- Based on the LSI SAS3008 12 Gbps controller

For more information, see the list of IBM Redbooks Product Guides in the RAID adapters category:
http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=raid

Internal drive options

The following table lists hard drive options for internal disk storage of the x3500 M4 server.

Table 9. Disk drive options for internal disk storage (Part 1)

Part number	Feature code	Description	Maximum supported
2.5" NL SATA Hot-Swap HDDs			
81Y9730	A1AV	IBM 1TB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	32
81Y9726	A1NZ	IBM 500GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	32
81Y9722	A1NX	IBM 250GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	32
2.5" NL SAS Hot-Swap HDDs			
81Y9690	A1P3	IBM 1TB 7.2K 6Gbps NL SAS 2.5" SFF HS HDD	32
90Y8953	A2XE	IBM 500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD	32
2.5" SAS 15K Hot-Swap HDDs			
81Y9670	A283	IBM 300GB 15K 6Gbps SAS 2.5" SFF HS HDD	32
90Y8926	A2XB	IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD	32
2.5" SAS 10K Hot-Swap HDDs			
00AD075*	A48S	IBM 1.2TB 10K 6Gbps SAS 2.5" G2HS HDD	32
81Y9650	A282	IBM 900GB 10K 6Gbps SAS 2.5" SFF HS HDD	32
90Y8872	A2XD	IBM 600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	32
90Y8877	A2XC	IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	32
2.5" SAS Hot-Swap SEDs			
00AD085*	A48T	IBM 1.2TB 10K 6Gbps SAS 2.5" G2HS SED	32
81Y9662	A3EG	IBM 900GB 10K 6Gbps SAS 2.5" SFF G2HS SED	32
90Y8908	A3EF	IBM 600GB 10K 6Gbps SAS 2.5" SFF G2HS SED	32
90Y8913	A2XF	IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS SED	32
90Y8944	A2ZK	IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS SED	32
2.5" SAS-SSD Hot-swap Hybrid Drives			
00AD102	A4G7	IBM 600GB 10K 6Gbps SAS 2.5" G2HS Hybrid	32
2.5" solid-state drives (SSDs) - Enterprise			
49Y6195	A4GH	IBM 1.6TB SAS 2.5" MLC HS Enterprise SSD	32
49Y6139	A3F0	IBM 800GB SAS 2.5" MLC HS Enterprise SSD	32
49Y6134	A3EY	IBM 400GB SAS 2.5" MLC HS Enterprise SSD	32
49Y6129	A3EW	IBM 200GB SAS 2.5" MLC HS Enterprise SSD	32
00W1125	A3HR	IBM 100GB SATA 2.5" MLC HS Enterprise SSD	32
41Y8331	A4FL	S3700 200GB SATA 2.5" MLC HS Enterprise SSD	32
41Y8336	A4FN	S3700 400GB SATA 2.5" MLC HS Enterprise SSD	32
41Y8341	A4FQ	S3700 800GB SATA 2.5" MLC HS Enterprise SSD	32

Table 9. Disk drive options for internal disk storage (Part 2)

Part number	Feature code	Description	Maximum supported
2.5" solid-state drives (SSDs) - Enterprise Value			
49Y5844	A3AU	IBM 512GB SATA 2.5" MLC HS Enterprise Value SSD	32
90Y8643	A2U3	IBM 256GB SATA 2.5" MLC HS Enterprise Value SSD	32
90Y8648	A2U4	IBM 128GB SATA 2.5" MLC HS Enterprise Value SSD	32
49Y5839	A3AS	IBM 64GB SATA 2.5" MLC HS Enterprise Value SSD	32
00AJ000	A4KM	S3500 120GB SATA 2.5" MLC HS Enterprise Value SSD	32
00AJ005	A4KN	S3500 240GB SATA 2.5" MLC HS Enterprise Value SSD	32
00AJ010	A4KP	S3500 480GB SATA 2.5" MLC HS Enterprise Value SSD	32
00AJ015	A4KQ	S3500 800GB SATA 2.5" MLC HS Enterprise Value SSD	32
3.5" SAS hot-swap HDDs			
49Y6102	A3DX	IBM 600GB 15K 6Gbps SAS 3.5" G2HS HDD	8
49Y6097	A3DW	IBM 450GB 15K 6Gbps SAS 3.5" G2HS HDD	8
49Y6092	A3DV	IBM 300GB 15K 6Gbps SAS 3.5" G2HS HDD	8
3.5" NL SAS Hot-swap HDDs			
49Y6210	A4AF	IBM 4TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	8
90Y8577	A2R2	IBM 3TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	8
90Y8572	A2U0	IBM 2TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	8
90Y8567	A26M	IBM 1TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	8
3.5" NL SAS Hot-Swap SEDs			
00W1543	A4AJ	IBM 4TB 7.2K 6Gbps NL SAS 3.5" G2HS SED	8
00W1533	A4AH	IBM 2TB 7.2K 6Gbps NL SAS 3.5" G2HS SED	8
3.5" NL SATA Hot-swap HDDs			
49Y6002	A3W9	IBM 4TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	8
81Y9798	A22S	IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	8
81Y9794	A22T	IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	8
81Y9790	A22P	IBM 1TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	8
81Y9786	A22Y	IBM 500GB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	8
3.5" NL SATA Simple-Swap HDDs			
49Y6012	A3WA	IBM 4TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	8
81Y9814	A22V	IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	8
81Y9810	A22W	IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	8
81Y9806	A22X	IBM 1TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	8
81Y9802	A22U	IBM 500GB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	8

* Not supported in E5-2600 v2 processor-based models.

Internal backup units

The server supports the internal tape drive options listed in the following table.

Table 10. Internal tape drives

Part number	Feature code	Description	Maximum supported
00D2786	A2VE	IBM RDX Internal USB 3.0 Dock with 320GB Cartridge	1
00D2787	A2VF	IBM RDX Internal USB 3.0 Dock with 500GB Cartridge	1
00D2788	A2VG	IBM RDX Internal USB 3.0 Dock with 1TB Cartridge	1
46C5364	-	IBM RDX Removable Hard Disk System - Internal USB 160 GB Bundle	1
46C5387	-	IBM RDX Removable Hard Disk System - Internal USB 320 GB Bundle	1
46C5388	-	IBM RDX Removable Hard Disk System - Internal USB 500 GB Bundle	1
46C5399	5711	IBM DDS Generation 5 USB Tape Drive	1
39M5636	5395	IBM DDS Generation 6 USB Tape Drive	1
43W8478	5393	IBM Half High LTO Gen 3 SAS Tape Drive	2*
44E8895	5397	IBM Half High LTO Gen 4 SAS Tape Drive	2*
49Y9898	5345	IBM Half High LTO Gen 5 Internal SAS Tape Drive	2*
00D8924	A3S3	IBM Half High LTO Ultrium Gen 6 Internal SAS Tape Drive	2*

* Note: With standard models, installation of a second tape drive requires removal of DVD-ROM.

USB tape drives are attached to the internal USB connector. SAS tape drives require SAS HBA (sold separately). See Table 14 for list of available SAS HBAs.

For more information, see the list of IBM Redbooks Product Guides in the Backup units category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tape

Optical drives

The server supports the optical drive options listed in the following table.

Table 11. Optical drives

Part number	Feature code	Description	Maximum quantity supported	Standard models where used
None*	4154	Half-High SATA DVD-ROM	2	A2x, B2x, C2x, C4x, D2x, F2x, G2x, H2x, J2x, A5x, B5x, C5x, C7x, C9x, D5x, F5x, G5x, G9x, H5x, J5x
81Y6404	4155	Half-High SATA Multiburner	2	-

* This option is only available via CTO or is already installed in standard models.

The two half-high drives in the table can be installed in any open 5.25" drive bay (Figure 5).

Half-High SATA DVD-ROM supports the following media and speeds for reading:

- CD-ROM 48X
- CD-DA (DAE) 40X
- CD-R 48X
- CD-RW 40X
- DVD-ROM (single layer) 16X
- DVD-ROM (dual layer) 12X
- DVD-R (4.7 GB) 16X
- DVD-R DL 12X
- DVD+R 16X
- DVD+R DL 12X
- DVD-RW (4.7 GB) 12X
- DVD+RW 12X
- DVD-RAM (4.7/9.4 GB) 6X

Half-High SATA multiburner supports the same media and speeds for reading as HH DVD-ROM. In addition, this drive supports the following media and speeds for writing:

- CD-R 24X
- CD-RW 4X
- High Speed CD-RW 10X
- Ultra Speed CD-RW 16X
- DVD-R 8X
- DVD-R DL 8X
- DVD+R 8X
- DVD+R DL 8X
- DVD-RW 6X
- DVD+RW 8X
- DVD-RAM 3X

I/O expansion options

The server supports up to eight PCIe slots: six slots (1 to 6) when one CPU is installed or eight slots when two CPUs are installed. These are the slot form factors:

- Slot 1: PCIe x8 (x4 wired); full-height, half-length (supports optional PCI-X interposer card)
- Slot 2: PCIe x8; full-height, half-length
- Slot 3: PCIe x8; full-height, full-length
- Slot 4: PCIe x8 (x4 wired); full-height, full-length
- Slot 5: PCIe x16; full-height, full-length
- Slot 6: PCIe x8 (x4 wired); full-height, full-length
- Slot 7: PCIe x16; full-height, full-length (requires second processor)
- Slot 8: PCIe x16; full-height, full-length (requires second processor)

All PCIe slots are PCI Express 3.0 slots except Slot 1, which is a PCI Express 2.0 slot. Slot 1 can be converted to a PCI-X slot with the PCI-X Conversion Kit, which is described in the following table.

Table 12. PCI riser card options

Part number	Feature code	Description	Maximum supported
81Y7012	A1G3	PCI-X Interposer Conversion Kit	1

Network adapters

x3500 M4 has four integrated Gigabit Ethernet ports. Integrated NICs have the following features:

- Intel I350AM4 chip
- Four GbE ports
- TCP Offload Engine (TOE) support
- Wake on LAN support
- 802.1Q VLAN tagging support
- NIC Teaming (load balancing and failover)

The following table lists additional supported network adapters.

Table 13. Network adapters

Part number	Feature code	Description	Maximum quantity supported (1 CPU / 2 CPUs)
10 Gb Ethernet			
49Y7910	A18Y	Broadcom NetXtreme II Dual Port 10GBaseT Adapter for IBM System x	6 / 8
42C1820	1637	Brocade 10Gb CNA for IBM System x**	6 / 8
None#*	A2UN	Emulex Dual Port 10GbE SFP+ Integrated VFA III for IBM System x**	1 / 1
95Y3762*	A2U1	Emulex Dual Port 10GbE SFP+ VFA III for IBM System x**	5 / 7
95Y3760*	A2U2	Emulex VFA III FCoE/iSCSI License for IBM System x (FoD) (license for Emulex VFA III adpaters, features A2UN and A2U1)	6 / 8
49Y7960	A2EC	Intel X520 Dual Port 10GbE SFP+ Adapter for IBM System x**	6 / 8
49Y7970	A2ED	Intel X540-T2 Dual Port 10GBaseT Adapter for IBM System x	6 / 8
42C1800	5751	QLogic 10Gb CNA for IBM System x**	6 / 8
1 Gb Ethernet			
90Y9370	A2V4	Broadcom NetXtreme I Dual Port GbE Adapter for IBM System x	6 / 8
90Y9352	A2V3	Broadcom NetXtreme I Quad Port GbE Adapter for IBM System x	6 / 8
49Y4230	5767	Intel Ethernet Dual Port Server Adapter I340-T2 for IBM System x	6 / 8
49Y4240	5768	Intel Ethernet Quad Port Server Adapter I340-T4 for IBM System x	6 / 8
42C1780	2995	NetXtreme II 1000 Express Dual Port Ethernet Adapter	6 / 8
49Y4220	5766	NetXtreme II 1000 Express Quad Port Ethernet Adapter	6 / 8
42C1750	2975	PRO/1000 PF Server Adapter by Intel	6 / 8

* Not supported in E5-2600 v2 processor-based models.
# Emulex Dual Port 10GbE SFP+ Integrated VFA III is only available through CTO or Special Bid (SBB 95Y3768)
** Require SFP+ optical transceivers or DAC cables that must be purchased separately.

For more information, see the list of IBM Redbooks Product Guides in the Networking adapters category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=networkadapters

Storage host bus adapters

The following table lists storage HBAs supported by the x3500 M4 server.

Table 14. Storage adapters

Part number	Feature code	Description	Maximum supported (1 CPU / 2 CPUs)
16 Gb Fibre Channel			
81Y1675	A2XV	Brocade 16Gb FC Dual-port HBA for IBM System x	6 / 8
81Y1668	A2XU	Brocade 16Gb FC Single-port HBA for IBM System x	6 / 8
81Y1662	A2W6	Emulex 16Gb FC Dual-port HBA for IBM System x	6 / 8
81Y1655	A2W5	Emulex 16Gb FC Single-port HBA for IBM System x	6 / 8
00Y3341	A3KX	QLogic 16Gb FC Dual-port HBA for IBM System x	6 / 8
00Y3337	A3KW	QLogic 16Gb FC Single-port HBA for IBM System x	6 / 8
8 Gb Fibre Channel			
46M6050	3591	Brocade 8Gb FC Dual-port HBA for IBM System x	6 / 8
46M6049	3589	Brocade 8Gb FC Single-port HBA for IBM System x	6 / 8
42D0494	3581	Emulex 8Gb FC Dual-port HBA for IBM System x	6 / 8
42D0485	3580	Emulex 8Gb FC Single-port HBA for IBM System x	6 / 8
42D0510	3579	QLogic 8Gb FC Dual-port HBA for IBM System x	6 / 8
42D0501	3578	QLogic 8Gb FC Single-port HBA for IBM System x	6 / 8
4 Gb Fibre Channel**			
59Y1993	3886	Brocade 4Gb FC Dual-port HBA for IBM System x	6 / 8
59Y1987	3885	Brocade 4Gb FC Single-port HBA for IBM System x	6 / 8
42C2071*	1699	Emulex 4Gb FC Dual-Port PCI-E HBA for IBM System x	6 / 8
42C2069*	1698	Emulex 4Gb FC Single-Port PCI-E HBA for IBM System x	6 / 8
39R6527	3568	Qlogic 4Gb FC Dual-Port PCIe HBA for System x	6 / 8
39R6525	3567	Qlogic 4Gb FC Single-Port PCIe HBA for System x	6 / 8
SAS			
46M0907	5982	IBM 6 Gb SAS HBA Controller	6 / 8
46C9010	A3MV	N2125 SAS/SATA HBA for IBM System x	3 / 3

* Withdrawn from marketing
* Not supported in E5-2600 v2 processor-based models.

For more information, see the list of IBM Redbooks Product Guides in the Host bus adapters category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=hba

PCIe SSD adapters

The server supports the High IOPS SSD adapters listed in the following table.

These adapters require:
- Tower to Rack Conversion Kit, part 81Y7006, feature A1X0
- Redundant Cooling Upgrade Kit, part 81Y7007, feature A1G2

Table 18. SSD adapters

Part number	Feature code	Description	Max supported (1 CPU / 2 CPUs)
46C9078	A3J3	IBM 365GB High IOPS MLC Mono Adapter	6 / 8
46C9081	A3J4	IBM 785GB High IOPS MLC Mono Adapter	6 / 8
90Y4361*	A3MZ	IBM 300GB High IOPS MLC Modular Adapter*	5 / 7
90Y4365*	A3N0	IBM 600GB High IOPS MLC Modular Adapter*	5 / 7
90Y4369*	A3N1	IBM 800GB High IOPS MLC Modular Adapter*	5 / 7
90Y4373*	A3N2	IBM 300GB High IOPS SLC Modular Adapter*	5 / 7
90Y4377	A3DY	IBM 1.2TB High IOPS MLC Mono Adapter	6 / 8

* For important ordering and installation information about the Modular Adapters, see https://ibm.com/support/entry/myportal/docdisplay?Indocid=SERV-IOMA

For details about these adapters, see the IBM Redbooks Product Guides in the Internal Storage category: http://www.redbooks.ibm.com/Redbooks.nsf/portals/systemx?Open&page=pg&cat=internalstorage

GPU adapters

The x3500 M4 server supports graphics processing units (GPUs) listed in the following table. Up to two GPUs are supported depending on the number of processors installed in a server (one GPU in slot 5 with one processor installed, or two GPUs in slot 5 and slot 7 with two processors installed).

Table 15. GPU adapters

Part number	Feature code	Description	Max. qty supported (1 CPU / 2 CPUs)
Intel Xeon processor E5-2600 v2 product family			
None*	A3YU	NVIDIA Quadro K4000	1 / 1
None*	A3WJ	NVIDIA Quadro K2000	1 / 1
None*	A3WH	NVIDIA Quadro K600	1 / 1
None*	A471	NVIDIA Tesla K20 (Actively Cooled)	1 / 2
Intel Xeon processor E5-2600 product family			
None*	A3YU	NVIDIA Quadro K4000	1 / 2
None*	A3WJ	NVIDIA Quadro K2000	1 / 2
None*	A3WH	NVIDIA Quadro K600	1 / 2
None*	A471	NVIDIA Tesla K20 (Actively Cooled)	1 / 2
00D4484*	A26Q	NVIDIA Quadro 6000	1 / 2
94Y5957	4798	NVIDIA Quadro 4000	1 / 2
00W2299	A1QU	NVIDIA Quadro 2000	1 / 2
81Y6399	A13K	NVIDIA Quadro 600	1 / 2

* If NVIDIA Quadro 6000 is installed in a PCIe slot, the next PCIe slot can not be used (if adapter is installed in slot 5, slot 6 can not be used; if adapter is installed in slot 7, slot 8 can not be used).

The use of a GPU adapter requires installation of one or two 900 W power supplies. 550 W or 750 W power supplies are not supported. The following additional rules apply:

- If the NVIDIA Quadro 600 is installed, the maximum memory that can be installed is 128 GB.
- If the NVIDIA Quadro 2000, 4000, or 6000 is installed, the maximum memory that can be installed is 512 GB.
- If NVIDIA Quadro K600, K2000, K4000, K5000, or Tesla K2 is installed, the maximum memory that can be installed is 1 TB.

Power supplies and redundant cooling

The server supports up to two redundant power supplies. Standard models come with one or two power supplies (model dependent). The server also comes standard with either two (for models with one processor installed) or three (for models with two processors installed) simple swap cooling fans. Optional upgrade is available to provide N+N cooling redundancy. The following table lists the power supplies and redundant cooling upgrade option.

Table 16. Power supplies

Part number	Feature code	Description	Maximum supported	Standard models where used
94Y5975	A22M	IBM System x 550W High Efficiency Platinum AC Power Supply	2	-
94Y5974	A1G8	IBM System x 750W High Efficiency Platinum AC Power Supply	2	A2x, B2x, C2x, C4x, D2x, F2x
94Y5973	A1G7	IBM System x 900W High Efficiency Platinum AC Power Supply	2	G2x, H2x, J2x
81Y7007	A1G2	Redundant Cooling Upgrade Kit	1	-

An AC power supply ships standard without a line cord, it must be purchased separately. The redundant cooling kit contains three simple swap fans. Certain rules apply to the selection of power supply, these rules are listed in Table 17. Table 17 uses the following conventions:

- A grey cell means that the server can be filled with drives, GPUs, processors and DIMMs up to the maximum number according to server specifications.
- A yellow cell means that the maximum number of drives, GPUs, processors or DIMMs that the server can hold is fewer than the total number listed in server specifications.

Table 17. Configuration rules based on power supply used (PSU = power supply unit, NS = no support)

Power supply	PSU qty	PSU red.*	Max. drive qty		Intermixing 2.5" + 3.5"	Max. GPU qty	CPU support	Max. DIMM qty supported		
			2.5"	3.5"				UDIMM	RDIMM	LRDIMM
550 W	1	No	8	8	No support	NS	Max. 95 W	16	16 SR or DR (NS for QR)	NS
	2	Yes	8	8	No support	NS	Max. 95 W	16	16 SR or DR (NS for QR)	NS
750 W	1	No	16	8	8 + 8 drives	NS	All (135 W)	16	24	16
	2	Yes	16	8	8 + 8 drives	NS	All (135 W)	16	24	16
900 W	1	No	32	8	8 + 8 drives	NS	All (135 W)	16	24	16
	1	No	8	8	No support	1 GPU	All (135 W)	16	24	16
	1	No	16	8	8 + 8 drives	NS	All (135 W)	16	24	24
	2	Yes	32	8	8 + 8 drives	NS	All (135 W)	16	24	16
	2	Yes	8	8	No support	1 GPU	All (135 W)	16	24	16
	2	Yes	16	8	8 + 8 drives	NS	All (135 W)	16	24	24
	2	No	32	8	8 + 8 drives	2 GPUs	All (135 W)	16	24	24

* PSU redundancy

Integrated virtualization

The server supports VMware ESXi installed on a USB memory key. The key is installed in a USB socket inside the server. The following table lists the virtualization options.

Table 18. Virtualization options

Part number	Feature code	Description	Maximum supported
41Y8298	A2G0	IBM Blank USB Memory Key for VMware ESXi Downloads	1
41Y8300	A2VC	IBM USB Memory Key for VMware ESXi 5.0	1
41Y8307	A383	IBM USB Memory Key for VMware ESXi 5.0 Update 1	1
41Y8311	A2R3	IBM USB Memory Key for VMware ESXi 5.1	1
41Y8382	A4WZ	IBM USB Memory Key for VMware ESXi 5.1 Update 1	1

Systems management

The server contains IBM Integrated Management Module II (IMM2), which provides advanced service-processor control, monitoring, and an alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM2 lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. Optionally, the IMM2 also provides a virtual presence capability for remote server management capabilities.

The IMM2 provides remote server management through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3
- Common Information Model (CIM)
- Web browser

The optional IMM Advanced Upgrade (software feature) is required to enable the remote presence and blue-screen capture features. The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz with up to 23 bits per pixel color depths, regardless of the system state
- Remotely accessing the server using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition. The following table lists the remote management option.

Table 19. Remote management option

Part number	Feature code	Description	Maximum supported
90Y3901	A1ML	IBM Integrated Management Module Advanced Upgrade	1

Supported operating systems

The server supports the following operating systems:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Datacenter x86 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Enterprise x86 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Standard x86 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Microsoft Windows Server 2008, Web x86 Edition
- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2 (support is planned for earlier in 2014)
- Microsoft Windows Small Business Server 2008 Premium Edition*
- Microsoft Windows Small Business Server 2008 Standard Edition*
- Red Hat Enterprise Linux 5 Server Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 for x86
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for x86
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- VMware ESX 4.1*
- VMware ESXi 4.1*
- VMware vSphere 5.0 (ESXi)
- VMware vSphere 5.1 (ESXi)

* Not supported with E5-2600 v2 processor-based servers.

See the IBM ServerProven® website for the latest information about the specific versions and service levels supported and any other prerequisites:
http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/matrix.shtml

Physical and electrical specifications

Dimensions and weight (approximate):

Tower:

- Width: 218 mm (8.6 in)
- Depth: 750 mm (29.5 in)
- Height: 440 mm (17.3 in)
- Weight:
  - Minimum configuration: 25.0 kg (55.1 lb)
  - Maximum configuration: 39.8 kg (87.7 lb)

Rack (using the Tower-to-Rack Conversion Kit, 81Y7006):

- Width: 424 mm (16.7 in)
- Depth: 702 mm (27.6 in)
- Height: 218 mm (8.5 in)
- Weight:
  - 24.5 kg (53.9 lb) (minimum configuration)
  - 39.3 kg (86.6 lb) (maximum configuration)

Supported environment:

- Air temperature
  - Server on: 10 - 35 °C (50 to 95 °F); altitude: 0 - 915 m (3,000 ft)
  - Server on: 10 - 32 °C (50 - 90 °F); altitude: 915 m (3,000 ft) - 2,134 m (7,000 ft)
  - Server on: 10 - 28 °C (50 - 83 °F); altitude: 2,134 m (7,000 ft) - 3,050 m (10,000 ft)
  - Server off (with standby power): 5 - 45 °C (41.0 - 113 °F)
  - Shipping: -40 - 60 °C (-40 - 140 °F)
- Humidity
  - Server on: 20 - 80% , Max. Dew Point 21 °C, Max. rate of change 5 °C/hr
  - Server off: 8 - 80%, Max. Dew Point 27 °C
- Electrical
  - Models with 900 W power supplies:
    - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 11 A
    - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 5.5 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.6 kVA
      - Maximum configuration: 1.1 kVA
  - Models with 750 W power supplies:
    - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 8.9 A
    - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 4.5 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.6 kVA
      - Maximum configuration: 0.9 kVA
- BTU output
  - Minimum configuration: 2013 Btu/hr (590 watts)
  - Maximum configuration: 3610 Btu/hr (1056 watts)

Warranty options

The IBM System x3500 M4 has a 3-year onsite warranty with 9x5/next business day terms. IBM offers the warranty service upgrades through IBM ServicePacs, discussed in this section. The IBM ServicePac is a series of prepackaged warranty maintenance upgrades and post-warranty maintenance agreements with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

IBM ServicePac offerings are country-specific. That is, each country might have its own service types, service levels, response times, and terms and conditions. Not all covered types of ServicePacs might be available in a particular country. For more information about IBM ServicePac offerings available in your country visit the IBM ServicePac Product Selector at:

https://www-304.ibm.com/sales/gss/download/spst/servicepac

The following table explains warranty service definitions in more detail.

Table 20. Warranty service definitions

Term	Description
IBM onsite repair (IOR)	A service technician will come to the server's location for equipment repair.
24x7x2 hour	A service technician is scheduled to arrive at your customer’s location within two hours after remote problem determination is completed. We provide service around the clock, every day, including IBM holidays.
24x7x4 hour	A service technician is scheduled to arrive at your customer’s location within four hours after remote problem determination is completed. We provide service around the clock, every day, including IBM holidays.
9x5x4 hour	A service technician is scheduled to arrive at your customer’s location within four business hours after remote problem determination is completed. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays. If after 1:00 p.m. it is determined that onsite service is required, the customer can expect the service technician to arrive the morning of the following business day. For noncritical service requests, a service technician will arrive by the end of the following business day.
9x5 next business day	A service technician is scheduled to arrive at your customer’s location on the business day after we receive your call, following remote problem determination. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays.

In general, the types of IBM ServicePacs are as follows:

- Warranty and maintenance service upgrades
  - One, 2, 3, 4, or 5 years of 9x5 or 24x7 service coverage
  - Onsite repair from next business day to 4 or 2 hours
  - One or 2 years of warranty extension
- Remote technical support services
  - One or three years with 24x7 coverage (severity 1) or 9x5/next business day for all severities
  - Installation and startup support for System x servers
  - Remote technical support for System x servers
  - Software support - Support Line
    - Microsoft or Linux software
    - VMware
    - IBM Systems Director

Regulatory compliance

The server conforms to the following standards:

- Energy Star 2.0
- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 4, Class A
- UL/IEC 60950-1
- CSA C22.2 No. 60950-1-07
- NOM-019
- Argentina IEC60950-1
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22:2006, Class A
- IEC-60950-1 (CB Certificate and CB Test Report)
- Taiwan BSMI CNS13438, Class A; CNS14336-1
- China CCC (GB4943-2001), GB9254-2008 class A, GB17625.1-2003
- Korea KN22, Class A; KN24
- CE Mark (EN55022 Class A, EN60950-1, EN55024, EN61000-3-2, and EN61000-3-3)
- CISPR 22, Class A
- TUV-GS EN60950-1 /IEC60950-1,EK1-ITB2000)
- Russia/GOST ME01, IEC-60950-1, GOST R 51318.22-99, GOST R 51318.24-99, GOST R 51317.3.2-99, GOST R 51317.3.3-99
- IEC 60950-1 (CB Certificate and CB Test Report)

External disk storage expansion

The server supports attachment to external storage expansion enclosures, such as the EXP2500 series, by using the ServeRAID M5120 SAS/SATA Controller. The server can also be attached to supported external storage systems, such as the IBM System Storage® DS3500 series, using the supported HBAs listed in Table 14.

The following table provides the ordering part numbers for the ServeRAID M5120 SAS/SATA Controller.

Table 21. Ordering part numbers and feature codes

Part number	Feature code	Description	Maximum quantity supported
81Y4478	A1WX	ServeRAID M5120 SAS/SATA Controller	3*
81Y4484	A1J3	ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade	3*
81Y4487	A1J4	ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade	3*
81Y4559	A1WY	ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade	3*
81Y4508	A22E	ServeRAID M5100 Series Battery Kit	3*
81Y4546	A1X3	ServeRAID M5100 Series RAID 6 Upgrade	1**
90Y4273	A2MC	ServeRAID M5100 Series SSD Performance Accelerator	1**
90Y4318	A2MD	ServeRAID M5100 Series SSD Caching Enabler	1**

* The maximum number of remotely mounted battery/supercap units must not exceed 3 for all controllers installed in a server. This may further limit the maximum number of M5120 controllers supported.
** Only one M5100 Series FoD software license is required per server.

The ServeRAID M5120 SAS/SATA Controller has the following specifications:

- Eight external 6 Gbps SAS/SATA ports
- Two external x4 mini-SAS connectors (SFF-8088)
- Supports RAID levels 0, 1, and 10
- Supports RAID levels 5 and 50 with optional M5100 Series RAID 5 upgrades
- Supports RAID 6 and 60 with the optional M5100 Series RAID 6 Upgrade
- Supports 512 MB battery-backed cache or 512 MB or 1 GB flash-backed cache
- Up to 6 Gbps throughput per port
- PCIe 3.0 x8 host interface
- Based on the LSI SAS2208 6 Gbps ROC controller
- Supports connectivity to the EXP2512 and EXP2524 storage expansion enclosures

For more information, see the IBM Redbooks® Product Guide *ServeRAID M5120 SAS/SATA Controller for IBM System x* at:
http://www.redbooks.ibm.com/abstracts/tips0858.html?Open

The ServeRAID M5120 SAS/SATA Controller supports connectivity to the IBM System Storage external expansion enclosures listed in the following table. Up to nine expansion enclosures can be daisy-chained per one M5120 external port. For better performance, distribute expansion enclosures evenly across both M5120 ports.

Table 22. IBM System Storage external expansion enclosures

Part number	Description	Maximum quantity supported per one M5120
174712X	IBM System Storage EXP2512 Express	18
174724X	IBM System Storage EXP2524 Express	9

The external SAS cables listed in the following table support connectivity between external expansion enclosures and the ServeRAID M5120 SAS/SATA Controller.

Table 23. External SAS cables for external storage expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
39R6531	IBM 3 m SAS Cable	1
39R6529	IBM 1 m SAS Cable	1

The following table lists the drives supported by EXP2512 external expansion enclosures.

Table 24. Drive options for EXP2512 external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
3.5-inch NL SAS HS HDDs		
49Y1903	1TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
49Y1902	2TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
90Y8720	3TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
3.5-inch SAS HS HDDs		
49Y1899	300GB 15,000 rpm 6Gb SAS 3.5" HDD	12
49Y1900	450GB 15,000 rpm 6Gb SAS 3.5" HDD	12
49Y1901	600GB 15,000 rpm 6Gb SAS 3.5" HDD	12

The following table lists the hard disk drives supported by EXP2524 external expansion enclosures.

Table 25. Drive options for EXP2524 external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
2.5-inch NL SAS HS HDDs		
49Y1898	500GB 7,200 rpm 6Gb SAS NL 2.5” HDD	24
81Y9952	1TB 7,200 rpm 6Gb SAS NL 2.5” HDD	24
2.5-inch SAS HS HDDs		
49Y1896	146GB 15,000 rpm 6Gb SAS 2.5” HDD	24
49Y1895	300GB 10,000 rpm 6Gb SAS 2.5” HDD	24
81Y9944	300GB 15,000 rpm 6Gb SAS 2.5” HDD	24
81Y9596	600GB 10,000 rpm 6Gb SAS 2.5” HDD	24
81Y9948	900GB 10,000 rpm 6Gb SAS 2.5” HDD	24
2.5-inch SAS HS SSDs		
81Y9956	200GB 2.5" SAS SSD	24
81Y9960	400GB 2.5" SAS SSD	24

External disk storage systems

The following table lists the external storage systems that are supported by the server and can be ordered through the System x sales channel. The server might support other IBM disk systems that are not listed in this table. Refer to IBM System Storage® Interoperation Center for further information.

Table 26. External disk storage systems

Part number	Description
1746A2D	IBM System Storage DS3512 Express Dual Controller Storage System
1746A2S	IBM System Storage DS3512 Express Single Controller Storage System
1746A4D	IBM System Storage DS3524 Express Dual Controller Storage System
1746A4S	IBM System Storage DS3524 Express Single Controller Storage System
181494H	IBM System Storage DS3950 Model 94
181498H	IBM System Storage DS3950 Model 98
181492H	IBM System Storage EXP395 Expansion Unit
1746A2E	IBM System Storage EXP3512 Express Storage™ Expansion Unit
1746A4E	IBM System Storage EXP3524 Express Storage Expansion Unit

For more information, see the list of IBM Redbooks Product Guides in the System Storage category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=externalstorage

External backup units

The server supports the external backup attachment options listed in Table 27.

Table 27. External backup options (Part 1)

Part number	Description
36251TY	IBM RDX USB 3.0 Dock with 1TB Cartridge (external)
362532Y	IBM RDX USB 3.0 Dock with 320GB Cartridge (external)
362550Y	IBM RDX USB 3.0 Dock with 500GB Cartridge (external)
362516X	IBM RDX Removable Hard Disk Storage System - External USB 160 GB Bundle
362532X	IBM RDX Removable Hard Disk Storage System - External USB 320 GB Bundle
362550X	IBM RDX Removable Hard Disk Storage System - External USB 500 GB Bundle

Table 27. External backup options (Part 2)

Part number	Description
3628L3X	IBM Half High LTO Gen 3 External SAS Tape Drive (with US line cord)
3628L4X	IBM Half High LTO Gen 4 External SAS Tape Drive (with US line cord)
3628L5X	IBM Half High LTO Gen 5 External SAS Tape Drive (with US line cord)
3628N3X	IBM Half High LTO Gen 3 External SAS Tape Drive (without line cord)
3628N4X	IBM Half High LTO Gen 4 External SAS Tape Drive (without line cord)
3628N5X	IBM Half High LTO Gen 5 External SAS Tape Drive (without line cord)
3580S3V	System Storage TS2230 Tape Drive Express Model H3V
3580S4V	System Storage TS2240 Tape Drive Express Model H4V
3580S5E	System Storage TS2250 Tape Drive Express Model H5S
3580S5X	System Storage TS2350 Tape Drive Express Model S53
3572S4R	TS2900 Tape Library with LTO4 HH SAS drive & rack mount kit
3572S5R	TS2900 Tape Library with LTO5 HH SAS drive & rack mount kit
35732UL	TS3100 Tape Library Model L2U Driveless
35734UL	TS3200 Tape Library Model L4U Driveless
46X2682†	LTO Ultrium 5 Fibre Channel Drive
46X2683†	LTO Ultrium 5 SAS Drive Sled
46X2684†	LTO Ultrium 5 Half High Fibre Drive Sled
46X2685†	LTO Ultrium 5 Half High SAS Drive Sled
46X6912†	LTO Ultrium 4 Half High Fibre Channel Drive Sled
46X7117†	LTO Ultrium 4 Half High SAS DriveV2 Sled
46X7122†	LTO Ultrium 3 Half High SAS DriveV2 Sled

† These part numbers are the tape drives options for 35732UL and 35734UL.

Note: The external tape drives listed can be ordered through the System x sales channel. The server might support other IBM tape drives that are not listed in this table. Refer to IBM System Storage Interoperation Center for further information.

External USB tape drives are connected to the external USB ports on the server. External SAS or Fibre Channel tape drives require respective HBA (sold separately, see Table 14).

For more information, see the list of IBM Redbooks Product Guides in the Backup units category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tape

Top-of-rack Ethernet switches

The server supports the top-of-rack Ethernet switches from IBM System Networking listed in the following table.

Table 28. IBM System Networking: Top-of-rack switches

Part number	Description
IBM System Networking - 1 Gb top-of-rack switches	
0446013	IBM System Networking RackSwitch G8000R
7309CFC	IBM System Networking RackSwitch G8000F
7309CD8	IBM System Networking RackSwitch G8000DC
7309G52	IBM System Networking RackSwitch G8052R
730952F	IBM System Networking RackSwitch G8052F
427348E	IBM Ethernet Switch J48E
6630010	Juniper Networks EX2200 24 Port
6630011	Juniper Networks EX2200 24 Port with PoE
6630012	Juniper Networks EX2200 48 Port
6630013	Juniper Networks EX2200 48 Port with PoE
IBM System Networking - 10 Gb top-of-rack switches	
7309DRX	IBM System Networking RackSwitch G8264CS (Rear to Front)
7309DFX	IBM System Networking RackSwitch G8264CS (Front to Rear)
7309BD5	IBM System Networking RackSwitch G8124DC
7309BR6	IBM System Networking RackSwitch G8124ER
7309BF7	IBM System Networking RackSwitch G8124EF
7309G64	IBM System Networking RackSwitch G8264R
730964F	IBM System Networking RackSwitch G8264F
7309-CR9	IBM System Networking RackSwitch G8264TR
7309-CF9	IBM System Networking RackSwitch G8264TF
0719-410	Juniper Networks EX4500 - Front to Back Airflow
0719-420	Juniper Networks EX4500 - Back to Front Airflow
IBM System Networking - 40 Gb top-of-rack switches	
8036ARX	IBM System Networking RackSwitch G8316R
8036AFX	IBM System Networking RackSwitch G8316F

For more information, see the list of IBM Redbooks Product Guides in the Top-of-rack switches category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tor

Uninterruptible power supply units

The server supports attachments to the uninterruptible power supply (UPS) units listed in the following table.

Table 29. Uninterruptible power supply units

Part number	Description
Tower UPS	
53961AX	IBM 1000VA LCD Tower UPS (120V)
53961JX	IBM 1000VA LCD Tower UPS (100V)
53961KX	IBM 1000VA LCD Tower UPS (230V)
53962AX	IBM 1500VA LCD Tower UPS (120V)
53962JX	IBM 1500VA LCD Tower UPS (100V)
53962KX	IBM 1500VA LCD Tower UPS (230V)
Rack-mounted UPS	
21304RX	IBM UPS 10000XHV
53951AX	IBM 1500VA LCD 2U Rack UPS (100V/120V)
53951KX	IBM 1500VA LCD 2U Rack UPS (230V)
53952AX	IBM 2200VA LCD 2U Rack UPS (100V/120V)
53952KX	IBM 2200VA LCD 2U Rack UPS (230V)
53953AX	IBM 3000VA LCD 3U Rack UPS (100V/120V)
53953JX	IBM 3000VA LCD 3U Rack UPS (200V/208V)
53956AX	IBM 6000VA LCD 4U Rack UPS (200V/208V)
53956KX	IBM 6000VA LCD 4U Rack UPS (230V)
53959KX	IBM 11000VA LCD 5U Rack UPS (200V/208V/230V)

For more information, see the list of IBM Redbooks Product Guides in the Power infrastructure category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=power

Power distribution units

The server supports attachments to the power distribution units (PDUs) listed in the following table.

Table 30. Power distribution units (part 1)

Part number	Description
Switched and Monitored PDUs	
46M4002	IBM 1U 9 C19/3 C13 Active Energy Manager DPI® PDU
46M4003	IBM 1U 9 C19/3 C13 Active Energy Manager 60A 3 Phase PDU
46M4004	IBM 1U 12 C13 Active Energy Manager DPI PDU
46M4005	IBM 1U 12 C13 Active Energy Manager 60A 3 Phase PDU
46M4167	IBM 1U 9 C19/3 C13 Switched and Monitored 30A 3 Phase PDU
46M4116	IBM 0U 24 C13 Switched and Monitored 30A PDU
46M4119	IBM 0U 24 C13 Switched and Monitored 32A PDU
46M4134	IBM 0U 12 C19/12 C13 Switched and Monitored 50A 3 Phase PDU
46M4137	IBM 0U 12 C19/12 C13 Switched and Monitored 32A 3 Phase PDU
Enterprise PDUs	
71762MX	IBM Ultra Density Enterprise PDU C19 PDU+ (WW)
71762NX	IBM Ultra Density Enterprise PDU C19 PDU (WW)
71763MU	IBM Ultra Density Enterprise PDU C19 3 Phase 60A PDU+ (NA)
71763NU	IBM Ultra Density Enterprise PDU C19 3 Phase 60A PDU (NA)
39M2816	IBM DPI C13 Enterprise PDU without linecord
39Y8923	DPI 60A Three Phase C19 Enterprise PDU with IEC309 3P+G (208 V) fixed line cord
39Y8941	DPI Single Phase C13 Enterprise PDU without line cord
39Y8948	DPI Single Phase C19 Enterprise PDU without line cord
Front-end PDUs	
39Y8934	DPI 32 amp/250 V Front-end PDU with IEC 309 2P+Gnd connector
39Y8935	DPI 63amp/250 V Front-end PDU with IEC 309 2P+Gnd connector
39Y8938	30 amp/125 V Front-end PDU with NEMA L5-30P connector
39Y8939	30 amp/250 V Front-end PDU with NEMA L6-30P connector
39Y8940	60 amp/250 V Front-end PDU with IEC 309 60A 2P+N+Gnd connector

Table 30. Power distribution units (part 2)

Part number	Description
Universal PDUs	
39Y8951	DPI Universal Rack PDU with US LV and HV line cords
39Y8952	DPI Universal Rack PDU with CEE7-VII Europe LC
39Y8953	DPI Universal Rack PDU with Denmark LC
39Y8954	DPI Universal Rack PDU with Israel LC
39Y8955	DPI Universal Rack PDU with Italy LC
39Y8956	DPI Universal Rack PDU with South Africa LC
39Y8957	DPI Universal Rack PDU with UK LC
39Y8958	DPI Universal Rack PDU with AS/NZ LC
39Y8959	DPI Universal Rack PDU with China LC
39Y8962	DPI Universal Rack PDU (Argentina)
39Y8960	DPI Universal Rack PDU (Brazil)
39Y8961	DPI Universal Rack PDU (India)
0U Basic PDUs	
46M4122	IBM 0U 24 C13 16A 3 Phase PDU
46M4125	IBM 0U 24 C13 30A 3 Phase PDU
46M4128	IBM 0U 24 C13 30A PDU
46M4131	IBM 0U 24 C13 32A PDU
46M4140	IBM 0U 12 C19/12 C13 60A 3 Phase PDU
46M4143	IBM 0U 12 C19/12 C13 32A 3 Phase PDU

For more information, see the list of IBM Redbooks Product Guides in the Power infrastructure category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=power

Rack cabinets

The x3500 M4 server can be installed in the rack with the Tower to Rack Conversion Kit (81Y7006). The resulting server is a 5U rack-mountable server. The server supports the rack cabinets listed in the following table.

Table 31. Rack cabinets and Tower to Rack Conversion Kits

Part number	Feature code	Description
Tower to rack conversion kits		
81Y7006	A1X0	5U Tower to Rack Conversion Kit
Rack cabinets		
201886X	-	IBM 11U Office Enablement Kit
93072PX	-	IBM 25U Static S2 Standard Rack
93072RX	-	IBM 25U Standard Rack
93074RX	-	IBM 42U Standard Rack
93074XX	-	IBM 42U Standard Rack Extension
93084EX	-	IBM 42U Enterprise Expansion Rack
93084PX	-	IBM 42U Enterprise Rack
93604EX	-	IBM 42U 1200 mm Deep Dynamic Expansion Rack
93604PX	-	IBM 42U 1200 mm Deep Dynamic Rack
93614EX	-	IBM 42U 1200 mm Deep Static Expansion Rack
93614PX	-	IBM 42U 1200 mm Deep Static Rack
93624EX	-	IBM 47U 1200 mm Deep Static Expansion Rack
93624PX	-	IBM 47U 1200 mm Deep Static Rack
99564RX	-	IBM S2 42U Dynamic Standard Rack
99564XX	-	IBM S2 42U Dynamic Standard Expansion Rack

For more information, see the list of IBM Redbooks Product Guides in the Rack cabinets and options category:
http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=rack

The Tower-to-Rack Conversion Kit Installation Instructions can be downloaded from:
https://ibm.com/support/entry/myportal/docdisplay?lndocid=migr-5089509

Figure 6 shows the server installed in the 5U Tower to Rack Conversion Kit.

Figure 6. The IBM System x3500 M4 with the 5U Tower to Rack Conversion Kit

Rack options

The server supports the rack console switches and monitor kits listed in the following table.

Table 32. Rack options

Part number	Feature code	Description
Monitor kits and keyboard trays		
17238BX	1723HC1 fc A3EK	IBM 1U 18.5" Standard Console
17238EX	1723HC1 fc A3EL	IBM 1U 18.5" Enhanced Media Console
172317X	1723HC1 fc 0051	1U 17in Flat Panel Console Kit
172319X	1723HC1 fc 0052	1U 19in Flat Panel Console Kit
Console switches		
1754D2X	1754HC2 fc 6695	IBM Global 4x2x32 Console Manager (GCM32)
1754D1X	1754HC1 fc 6694	IBM Global 2x2x16 Console Manager (GCM16)
1754A2X	1754HC4 fc 0726	IBM Local 2x16 Console Manager (LCM16)
1754A1X	1754HC3 fc 0725	IBM Local 1x8 Console Manager (LCM8)
Console cables		
43V6147	3757	IBM Single Cable USB Conversion Option (UCO)
39M2895	3756	IBM USB Conversion Option (4 Pack UCO)
39M2897	3754	IBM Long KVM Conversion Option (4 Pack Long KCO)
46M5383	5341	IBM Virtual Media Conversion Option Gen2 (VCO2)
46M5382	5340	IBM Serial Conversion Option (SCO)

For more information, see the list of IBM Redbooks Product Guides in the Rack cabinets and options category:

http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=rack

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Related publications and links

For more information see these resources:

- IBM System x3500 M4 product page
  http://www.ibm.com/systems/x/hardware/rack/x3500m4/
- IBM System x3500 M4 Installation and User's Guide
  https://ibm.com/support/entry/myportal/docdisplay?lndocid=migr-5089504
- 5U Tower-to-Rack Conversion Kit
  https://ibm.com/support/entry/myportal/docdisplay?lndocid=migr-5089509
- IBM System x3500 M4 Problem Determination and Service Guide
  https://ibm.com/support/entry/myportal/docdisplay?lndocid=migr-5089505
- ServerProven hardware compatibility page for the x3500 M4
  http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/xseries/7383.html
- IBM Redbooks Product Guides for IBM System x servers and options
  http://www.redbooks.ibm.com/portals/systemx?Open&page=pgbycat
- Configuration and Option Guide
  http://www.ibm.com/systems/xbc/cog/
- xREF: IBM x86 Server Reference
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- IBM System Storage Interoperation Center
  http://www.ibm.com/systems/support/storage/ssic

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